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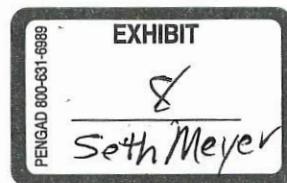


Pork and Swine



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Robert B. Koopman
Director, Office of Operations

Karen Laney
Director, Office of Industries

This report was prepared principally by:

John Giamalva, Office of Industries
Livestock, Dairy, and Fishery Products
john.giamalva@usitc.gov

With supporting assistance from:

Phyllis Boone, Office of Industries

Peg Hausman and David Lundy,
Office of Analysis and Research Services

Carolyn Holmes and Darlene Smith,
Statistical Support Division,
Office of Investigations

Sonya Wilson,
Help Desk and Customer Service Division,
Office of the Chief Information Officer

Under the direction of:

Jonathan Coleman, *Chief*
Agriculture and Fisheries Division

Address all communications to:

Secretary to the Commission
United States International Trade Commission
Washington, DC 20436
www.usitc.gov

Preface

The United States International Trade Commission (USITC) initiated its current Industry and Trade Summary series of reports to provide information on the rapidly evolving trade and competitive situation of the thousands of products imported into and exported from the United States. International supply chains have become more global and competition has increased.

Each Industry and Trade Summary addresses a different commodity/industry and contains information on trends in consumption, production, and trade, as well as an analysis of factors affecting industry trends and competitiveness in domestic and foreign markets. This report on swine and pork primarily covers the period 2008 through 2013.

Papers in this series reflect ongoing research by USITC international trade analysts. The work does not represent the views of the USITC or any of its individual Commissioners. This paper should be cited as the work of the author only, and not as an official Commission document.

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Abbreviations and Acronyms

Item	Description
ADI	Acceptable daily intake
AFRI	Agriculture and Food Research Initiative
ARS	Agricultural Research Service
AQIS	Australian Quarantine Inspection Service
AUV	Average unit value
BLS	Bureau of Labor Statistics
CIF	Cost plus insurance and freight
COOL	Country-of-origin labeling
CPI	Consumer price index
CSFII	Continuing Survey of Food Intakes by Individuals
CSREES	Cooperative State Research, Education, and Extension Service
DG	Distiller's grains
DDG	Dried distiller's grains
DDGS	Dried distiller's grains with solubles
ERS	Economic Research Service
EU	European Union
FAS	Foreign Agricultural Service
FMD	Foot and mouth disease
FTA	Free trade agreement
GIPSA	Grain Inspection, Packers and Stockyards Administration
HTS	Harmonized Tariff System of the United States
JECFA	Joint Food and Agriculture Organization/World Health Organization (FAO/WHO) Expert Committee on Food Additives
kg	Kilogram
MFN	Most-favored nation
MRL	Maximum residue limit
mt	Metric ton
µg	Microgram
NAFTA	North American Free Trade Agreement
NASS	National Agricultural Statistics Service
NIFA	National Institute of Food and Agriculture
OIE	World Animal Health Organization
PED	Porcine epidemic diarrhea
PMWS	Post-wearing Multi-systemic Wasting Syndrome

Item	Description
Ppb	Parts per billion
PRRS	Porcine reproductive and respiratory syndrome
TRQ	Tariff rate quota
USDA	U.S. Department of Agriculture
USDOL	U.S. Department of Labor
USITC	U.S. International Trade Commission
VAT	Value-added tax
WTO	World Trade Organization

Glossary

Item	Description
Barrow	Neutered male hog
Boar	Male hog kept for breeding
Farrow	Birth of a piglet
Farrow-to-finish	Production phase encompassing the entire life cycle of the slaughter hog, from birth (farrowing) through finishing (just prior to slaughter)
Farrow-to-wean	Production phase from birth through weaning at about 2–3 weeks of age
Feeder pig	Young hog, typically 6–8 weeks old and 40–50 pounds weight
Gilt	Female hog that has not borne a litter
Market hog	Adult hog for slaughter
Parity	Number of farrowings or litters that have been borne by a sow
Sow	Female hog that has borne at least one litter
Weanling	Weaned pig, typically 2–3 weeks of age

Key Points

The United States is the world's third-largest producer of pork, and the largest exporter. U.S. pork production accounted for approximately 10 percent of global production throughout 2008–13. China is the world's largest producer and consumer of pork, and accounts for nearly one-half of both. The European Union (EU) is the second-largest pork producer and the largest net exporter of pork. The EU accounted for just over 20 percent of global pork production throughout 2008–13. U.S. swine production is largely by large-scale commercial operations. Most U.S. pigs are raised by producers with over 5,000 swine and most are owned by firms that each own over 50,000 swine. The U.S. pork processing industry is also very concentrated, and has been throughout the period.

U.S. swine production continued a long-term trend of increasing concentration over 2008–12 in terms of the share of swine inventory on large farms and even more so, in terms of swine ownership. Increased integration within the industry was evident in the decline in the share of spot sales in the number of swine sold and the corresponding increase in the share of sales through contracts or marketing agreements, a slight increase in packer ownership of swine, and the ongoing concentration of swine production and ownership. Production trends over the period include increases in the number of surviving piglets per sow and increased feed efficiency. The increase in piglets per sow was due to increases in most size classes of producers and to the continuing concentration, as the average number of piglets per sow is higher for larger operations.

Feed accounts for the majority of the cost of raising swine, and the inability to fully pass along increased costs led to losses for most U.S. swine farmers and pork producers in 2009. Since that time, despite substantially higher feed costs in 2011 and 2012, U.S. swine farmers have generally been able to pass along higher feed costs and have thus been profitable. Pork processors were also generally profitable in 2010 and 2011 (the latest data available).

The United States is the largest exporter of pork and a relatively minor pork importer. U.S. pork imports are mostly from Canada and the major pork-producing countries in the EU, with some imports from Mexico as well. Many U.S. pork imports are of products such as ribs that are in greater demand in the United States than in other markets. Other pork imports from Canada and Mexico are due to the proximity of pork production in the neighboring North American Free Trade Agreement (NAFTA) countries. Major export markets for U.S. pork include Japan, Mexico, Canada, China/Hong Kong, and Korea. Pork exports declined substantially in 2009 from 2008, and then increased in volume to reach a maximum in 2012. U.S. pork exports declined in 2013, to approximately the 2008 volume.

The United States is a minor exporter of swine and the world's largest swine importer. The vast majority of U.S. swine imports are from Canada, and the majority of these are of pigs weighing less than 50 kg to be raised by U.S. producers (feeder pigs). There are also significant imports of swine over 50 kg (generally for immediate slaughter), also mostly from Canada, and much

smaller imports of purebred swine for breeding. Most U.S. swine exports are of purebred swine, with smaller exports of swine weighing less than 50 kg and swine for slaughter.

One factor that significantly affected U.S. pork exports over 2008–13 has been the use of the feed supplement ractopamine. Ractopamine is a veterinary drug that redirects energy from fat synthesis to protein synthesis and encourages the gain of lean meat over fat. Ractopamine has been approved by the U.S. Food and Drug Administration (FDA) and is widely used in the United States and in several other pork producing countries. After years of debate, its use was approved by the Codex Alimentarius Commission in 2012, and a maximum residue level (MRL) was recommended. However, ractopamine use is prohibited in China and the EU (the two largest pork consumers), and imports of pork from swine raised with the use of ractopamine are not allowed. In 2013, Russia also banned imports of pork from swine raised with the use of ractopamine. In response to the demand for ractopamine-free pork, some U.S. producers have moved away from its use for part or all of their production.

Introduction

The U.S. pork industry—which encompasses both live swine (hogs and pigs) and meat of swine (pork)—is the third-largest in the world, behind those of China and the European Union (EU). U.S. pork production accounted for about one 10th of global production in 2008–13. Most U.S. pork is consumed domestically (table 1). Although the industry primarily focuses on the domestic market, exports have become increasingly important to U.S. producers, and the United States is the world's largest pork exporter.

This summary covers both live swine and fresh, chilled, or frozen meat of swine (box 1).¹ It provides information about (1) industry structure both within the United States and in certain foreign countries, (2) key domestic and foreign tariff and non-tariff measures that affect trade in swine and pork, and (3) competitive conditions in both domestic and foreign markets. The time period covered in this summary is generally 2008–13.²

Box 1 Industry definitions

Swine are mono-gastric (single-stomach), litter-bearing mammals that weigh between 400 and 600 pounds at maturity, depending on breed and gender. In general usage, swine are referred to as hogs and pigs. The term “hogs” generally refers to mature animals, and “pigs” to young animals.

Meat of swine is commonly referred to as pork, which is light red in color before it is cooked. White fat (lard) covers much of the swine carcass and some fat is also dispersed throughout the meat. U.S. production of fresh, chilled, or frozen pork for table use or for processing is estimated at about 10.5 million metric tons (mt) (23.1 billion pounds) in 2013. This was slightly below the peak volume of 10.6 million mt produced in 2008 and the 10.56 million mt produced in 2012, but an increase over annual production levels during 2009–11.³

The industry includes both farming operations that raise swine and processors that slaughter swine to produce pork, as well as operations that further process pork into cuts for sale through the retail and foodservice sectors. It includes the North American Industry Classification System (NAICS) category 112210, Hog and Pig Farming, as well as parts of NAICS 311611, Animal (Except Poultry) Slaughter; and NAICS 311612, Meat Processed from Carcasses.

Over the 2008–12 period, the U.S. swine industry became more efficient; both increasing its feed efficiency and incrementally increasing the number of piglets produced annually per breeding sow. Increased feed efficiency is attributable to improved genetics and management practices.⁴ The increase in piglets per sow has been driven by efficiency increases in all size

¹ However, this summary does not include other products of swine—hides, lard, edible or inedible offal, or processed pork products.

² Trade and production data for 2013 are generally available. However, some data, particularly that covering industry profitability for 2013 were not available at the time of publication.

³ USDA, FAS, Production, Supply, and Distribution database (accessed February 27, 2014). Production is expressed in carcass-weight equivalent.

⁴ Stadler, “Pork Industry Productivity Analysis,” August 2013, 2.

classes of producers, as well as continuing consolidation and vertical integration within the industry.

Swine production has continued to follow the ongoing trend to greater concentration, with fewer producers in the smallest size class and more swine produced by the largest size class of producers. Swine ownership is more concentrated than is production. Many swine producers do not own the swine they are raising, and pork producers today own more swine in the “pipeline.” Swine production has also become more vertically integrated. Swine that are not already owned by pork producers are often purchased under contract for future delivery. This has brought on changes in the way swine are sold and evaluated. Fewer swine are sold on the spot or cash market.⁵ Instead, many swine are purchased through contracts in advance of delivery, with prices set by a formula. Formula prices are increasingly based on carcass attributes, with swine sold on a carcass-weight basis rather than on a live-weight basis.⁶

Feed, of which corn and soybeans are the primary ingredients, accounts for the largest share of costs to swine producers. During 2008–13, prices for corn and soybean meal were very volatile. Higher feed costs in 2008 contributed to losses for U.S. swine producers in 2009, as swine sales prices generally declined in 2009 on softer demand. Most pork packers also suffered losses in 2009, since a portion of the increased costs were passed on by swine producers. Since 2009, however, swine and pork producers have generally been able to pass along increases in feed costs. Hog prices rose significantly in 2010, as did prices for feeder pigs, and average returns exceeded total costs for swine producers, particularly for farrow-to-finish operators.⁷ Further feed cost increases in 2011 and 2012 led to lower, but still positive, profits for most segments of the industry and the industry as a whole in 2011 and 2012.⁸

International trade in live swine plays a small role in the U.S. industry and a small role in global production generally, except for U.S. imports of feeder pigs from Canada. U.S. swine producers also import relatively small numbers of swine for breeding purposes, predominantly from the EU. Between 2005 and 2008, total annual swine imports as a ratio to U.S. production ranged between 8 and 9 percent. Since 2008, swine imports have declined both in absolute terms and as a share of production, falling to approximately 5 percent of U.S. swine production in 2012 and 4 percent in 2013.

The United States is the world’s largest exporter of pork.⁹ In 2008, U.S. pork production reached its highest level ever reported, partly in response to increased demand by China, the world’s largest producer and consumer of swine and pork. During 2008–10, U.S. pork production fell about 5 percent, as producers were unable to pass on rapidly rising feed costs. However, in 2011–12, U.S. pork production increased to nearly the peak level observed in 2008,

⁵ Calculations by USITC staff from USDA, *AMS Weekly National Direct Swine Report*, 2008–13.

⁶ Grimes and Plain, *U.S. Hog Marketing Contract Study*, January 2009, 1–2.

⁷ Farrow-to-finish operators engage in all stages of production from breeding through “finishing,” which is the final stage before slaughter.

⁸ Not all producers engage in all four production phases (of breeding and gestation, farrowing, feeding, and finishing). In 2012, average costs for U.S. producers in the farrowing-to-weanling segment (a subset of farrow-to-feeder pig) exceeded the value of production. Other segments of the industry were profitable in 2011–12. USDA, ERS, “Commodity Costs and Returns” (accessed August 29, 2014).

⁹ However, the EU is the world’s largest net exporter of pork, as its imports are lower.

and U.S. exports surpassed 2008 levels. U.S. pork exports were equivalent to about 20 percent of U.S. production in 2008 and 23 percent in 2012. Exports declined slightly in 2013 on a volume basis, and were equivalent to about 22 percent of production.

A major issue that has affected U.S. production and exports is the use of feed additives to increase feed efficiency and foster production of edible meat over fat. Ractopamine, one of a class of beta agonists, is widely used in U.S. swine production. When added to feed, beta agonists redirect energy to protein synthesis over fat synthesis. Hence, the use of ractopamine lowers feed costs and can shorten production time. The product is broken down rapidly, and there is no prescribed withdrawal time when the product is used according to label directions.¹⁰

Ractopamine is approved for use in swine diets by the U.S. Food and Drug Administration (FDA). It has also been approved for use in several other major swine-producing countries, and was approved by the Codex Alimentarius Commission in 2012. However, the product has not been approved in some major U.S. export markets, including China, the EU, and since 2013, Russia. Going forward, unless agreement is reached with major importers, ractopamine use could significantly hamper continued growth of U.S. pork exports.

Imports account for only a small share of the overall U.S. supply of pork. U.S. pork imports, predominantly from Canada and the EU, ranged from 4.3 percent to 4.5 percent of U.S. consumption in 2008–13 as imports increased slightly and consumption declined slightly over the period.

U.S. Industry

Production Trends

As noted earlier, U.S. swine and pork production fell slightly between 2008 and 2010 and have since increased. Similarly, pork exports also declined in 2009, and then rebounded; in 2012, they were slightly above 2008 levels, before declining in 2013 (table 1). U.S. pork production in 2013 was nearly equal to that in 2008, with increased exports partly offsetting lower domestic consumption. The U.S. accounted for about 10 percent of global swine production and about 10 percent of global pork production throughout 2008–13.

Table 1 U.S. swine and pork production, trade, and consumption, 2008–13

	2008	2009	2010	2011	2012	2013
Swine	1,000 head					
U.S. beginning stocks	68,177	67,148	64,887	64,925	66,361	66,373
U.S. production	115,030	114,542	113,685	115,838	117,601	118,853
U.S. imports	9,348	6,365	5,749	5,795	5,656	4,957
U.S. exports	97	21	15	30	55	26
U.S. total supply	192,555	188,055	184,321	186,558	189,618	190,183
Global production	1,170,841	1,187,557	1,216,119	1,202,597	1,240,883	1,257,161

¹⁰ Elanco, “Paylean” 2014; Sterle, “The Facts about Paylean-Ractopamine for Swine,” n.d.

	2008	2009	2010	2011	2012	2013
Global exports	12,608	9,634	8,592	8,544	8,236	7,275
Pork			1,000 metric tons carcass weight			
U.S. production	10,599	10,442	10,186	10,331	10,555	10,508
U.S. imports	377	378	390	364	364	389
U.S. exports	2,110	1,857	1,915	2,354	2,441	2,292
U.S. total supply	11,211	11,108	10,814	10,940	11,165	11,180
U.S. consumption	8,813	9,013	8,654	8,340	8,441	8,616
Global production	97,923	100,323	103,188	102,285	105,651	107,514
Global exports	6,220	5,632	6,031	6,948	7,254	7,058

Source: USDA Production, Supply and Distribution database, accessed February 27, 2014.

Note: Data on pork are on a carcass-weight basis and are not directly comparable with data on a product-weight basis. Total supply includes carryover stocks.

The value of U.S. swine production in 2013 was \$21.4 billion, up from \$14.5 billion in 2008 and up sharply from the low of \$12.8 billion value of production in 2009.¹¹ The 2008–09 decline was chiefly due to a fall in hog prices in 2009, as the number of swine produced declined only slightly from 2008 and the number marketed increased, as shown in table 2. After 2009, hog prices improved. The average annual price reached a maximum in 2011, and the value of U.S. production increased in 2012 and 2013, as the number of swine produced and marketed increased. Since 2009, returns have been positive for both typical farrow-to-finish operations and feeder-to-finish operations.¹²

Table 2 Annual U.S. pig crop, number of hogs marketed, and average prices, 2008–12

Year	Pig crop ^a	Hogs marketed	Price, 51–52 percent lean hogs
	Millions	Millions	Dollars per 100 pounds
2008	115.0	149.0	47.85
2009	114.5	150.1	41.22
2010	113.7	144.5	55.07
2011	115.8	145.7	66.13
2012	117.7	152.7	61.12
2013	116.4	152.7	64.11

Source: USDA, NASS, Meat Animals Production, Disposition, and Income, annual summary, 2009–14; USDA, ERS, Meat Price Spreads Data, August 19, 2014.

^aPig crop data are from December of previous year through November. Number of hogs marketed differs from pig crop because of imports and exports of swine, and changes in inventory.

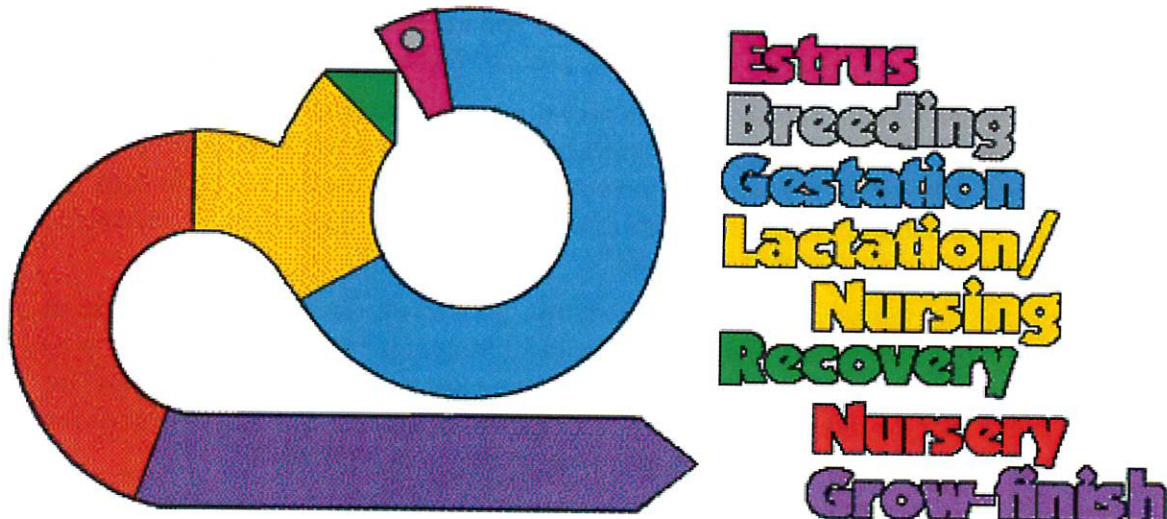
One aspect of swine production that has been studied extensively by agricultural economists for many years is the “hog cycle.” Production of swine has been observed to go through cyclical fluctuations of accumulation and liquidation that last about four years. Producers enter the market or increase production in response to improving market conditions. The increased production then leads to lower prices, causing producers to exit the market or decrease production. One theory is that producers are only able to expand production when prices are high, and are forced to cut production expenditures when prices are low. Thus there is a

¹¹ USDA, NASS, *Meat Animals Production, Disposition, and Income 2012 Summary*, April 2013, 17; USDA, NASS, *Meat Animals Production, Disposition, and Income 2008 Summary*, May 2009, 16.

¹² USDA, ERS, “Commodity Costs and Returns” (accessed August 29, 2013).

quantity cycle, and an opposite price cycle. The hog cycle is driven by the pig's biology (figure 1 and box 2).

Figure 1 Swine production cycle illustrated



Source: Pitcher and Springer, University of Pennsylvania School of Veterinary Medicine, 1997.

- Breeding and gestation of sow, 15 weeks
- Birth to breeding age, 32 weeks
- Gestation, 16 weeks
- Birth: 8–9 newborn pigs roughly every 6 months
- Weaning, 2–3 weeks
- Nursery/growing/backgrounding, 6 weeks
- Finishing, 16–20 weeks

Source: USDA, ERS, *Briefing Room – Hogs: Background*, June 22, 2012.

Note: Phases and times are for illustration only. Actual industry values will vary by season, region, and firm.

Box 2 Swine and pork production

The typical hog production cycle lasts about 4 years. This is a function of the hog biological cycle. Given the length of time needed to breed an existing sow, choose and retain offspring for breeding, and breed and rear the resulting crop of piglets, it takes nearly 2 years to substantially increase production. The swings in supply that mark the hog cycle have become less pronounced but also less regular over time. This dampening of the hog production cycle may be due to the effect of a shift in U.S. production to larger integrated operators that are able to absorb losses during periods of lower prices. Such operators are less apt to cut production significantly only to increase it two years later.¹³

Swine production consists of four basic phases: (1) breeding and gestation, (2) farrowing, (3) feeding, and (4) finishing. The gestation period for swine is 113–16 days, after which a litter of typically 8–12 pigs is born or “farrowed.” In most modern U.S. swine operations, the newborn pigs stay with the sow for 2–3 weeks and are then weaned. At this point, the pigs may be

¹³ CME Group, Livestock Daily Report, Vol. 8, No. 174, September 8, 2010; North Dakota State University, Hog Market Cycles, January 1996, 6; North Dakota State University, Market Advisor: The Hog Cycle—Revisited, August 22, 2002, 2.

referred to as “weanlings.” After weaning, pigs are typically removed to a separate nursery facility until 6–10 weeks of age. At this point, pigs may be referred to as “feeder” pigs. The feeder pigs are moved to a growing/finishing area, where they stay until they reach a marketable weight of 250–75 pounds at 5–6 months of age. The average dressed weight of barrows and gilts in the United States in 2012 was 203 pounds. The average dressed weight of all hogs was slightly higher, at 206 pounds, because of the higher dressed weights of sows.¹⁴

A producing sow can be bred shortly after the previous litter is weaned. Therefore, a sow can potentially produce slightly more than two litters per year. Over 2008–12, the number of litters per breeding sow per year in the U.S. herd increased only very slightly, from 1.99 in 2008 to 2.01 in 2012.¹⁵ The number of piglets per litter increased for larger operations and declined slightly for operations with less than 100 head.

On average, sows are replaced after bearing 3–4 litters, but this varies greatly, depending on reproductive history, sow health, and the availability of replacement animals.¹⁶ “Parity” is the number of litters a sow has borne. A recent study of the most productive U.S. and Canadian sow herds found that the average parity for these operations was 2.7, but that over one-third of sows were parity 4 or higher, and 6.6 percent were parity 7 or higher.¹⁷

Slaughter plants (also referred to as packers) slaughter the animals and produce pork, edible pork offal (variety meats), lard, and inedible products. The purchase of hogs for slaughter is by far the greatest expense for packing plants. In 2011, the cost of materials was equivalent to 77.4 percent of the value of shipments for NAICS industry 31161N, Animal (except poultry) Slaughter and Processing. Thus, the hog cycle drives much of production costs in the pork industry as well.

Geographic Distribution

Most swine in the United States are raised in areas close to major sources of feed. Typically, corn is the major source of energy in swine feed, and soybean meal is the major source of protein. Hence, the major growing areas for swine in the United States are the Corn Belt¹⁸ and the Southeastern states.¹⁹ Throughout 2008–13, the Corn Belt accounted for nearly three-fourths of all swine produced in the United States. This share slightly increased over the period, at the expense of both the Southeast and the rest of the nation. The share of U.S. swine production (on a weight basis) in the 10 Corn Belt states increased from 71 percent in 2008 to 73 percent in 2013.²⁰ In 5 of these states, their shares of national swine production increased over the past five years. Thirteen states outside of the Corn Belt also recorded an increase in

¹⁴ A barrow is a castrated male pig raised for slaughter. A gilt is an immature female pig. Barrows and gilts accounted for 96.8 percent of federally inspected slaughter in 2012. Sows, at an average dressed weight of 306 pounds, accounted for 2.9 percent, and boars, at an average dressed weight of 208 pounds, accounted for the remaining 0.3 percent. USDA, NASS, Livestock Slaughter 2012 Summary, April 2013, 9, 16.

¹⁵ Calculated from data in USDA, NASS, “Quarterly Hogs and Pigs,” various issues.

¹⁶ USDA, ARS, Sow Welfare Fact Sheet, Fall, 2010, 1.

¹⁷ Rix and Ketchem, “A Closer Look at Sow Herd Parity Structure,” National Hog Farmer, September 3, 2010, 1.

¹⁸ The Corn Belt consists of the Midwestern states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin.

¹⁹ The Southeastern states are Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.

²⁰ USDA, NASS, *Meat Animals Production, Disposition, and Income*, annual summaries.

their shares of national swine production over the past five years, but each of these—except Oklahoma (4.3 percent) and Pennsylvania (1.5 percent)—accounted for less than 1 percent of U.S. production in 2013.

Iowa was the leading swine- and pork-producing state in every year between 2008 and 2013 (table 3). It also recorded the most rapid expansion of swine production over the period. The state's share of overall U.S. pork production increased from 30 percent in 2008 to 34 percent in 2013. Other Corn Belt states, such as Minnesota and Illinois have also substantially expanded production since 2008. These states benefit from access to nearby feed supplies of corn and soybean meal. North Carolina was the only top-5 producing state not located in the Corn Belt. It was the second-largest pork-producing state during 2008–10, dropped to third place in 2011 and 2012, behind Minnesota, and was the second-largest producing state in 2013. State-level production data for all states are presented in appendix A.

Table 3 Swine production in major producing states, 2008–13 (billion pounds)

State	2008	2009	2010	2011	2012	2013
Iowa	9.4	9.6	9.3	9.8	10.4	10.7
North Carolina	4.2	4.1	3.8	3.7	3.9	4.1
Minnesota	3.8	3.7	3.7	3.7	4.0	3.9
Illinois	1.7	1.8	1.9	1.9	2.0	2.0
Indiana	1.7	1.7	1.8	1.8	1.8	1.6
Oklahoma	1.3	1.3	1.3	1.3	1.3	1.4
Missouri	1.7	1.7	1.3	1.3	1.3	1.3
Nebraska	1.4	1.4	1.4	1.3	1.3	1.2
All other	6.1	6.1	6.1	6.2	6.2	6.2
Total	31.4	31.4	30.5	31.0	32.2	32.2

Source: USDA, NASS, Meat Animals Production, Disposition, and Income annual summaries 2008–12.

Swine Production Capacity

The important determinants of capacity in swine production are the number of sows, the number of surviving piglets produced per litter and the number of litters per sow per year. The number of animals kept for breeding by U.S. swine producers declined 2008–10, but has since increased (table 4). In 2012, the number of animals kept for breeding remained 5 percent below the level observed in 2008. Over the last five years, the share of breeding animals in the Corn Belt states increased slightly, and the share in the Southeast declined. However, the share of breeding animals in the Corn Belt states was not as high, and did not increase as rapidly as the share of pork production.

Table 4 Number of U.S. hogs kept for breeding, by region, December 2008–13 (number)

Breeding hogs	2008	2009	2010	2011	2012	2013
Corn Belt	3,655	3,575	3,585	3,583	3,582	3,525
Southeast	1,277	1,178	1,175	1,063	1,090	1,086
All other	1,126	1,115	1,018	1,158	1,146	1,147
Total	6,062	5,850	5,778	5,803	5,817	5,757

Source: USDA, NASS, "Quarterly Hogs and Pigs," December 2008, 2009, 2010, 2011, 2012, and 2013.

The average number of surviving piglets per litter increased for all size groups of U.S. operations between 2008 and 2013. As most swine are produced in large operations, the U.S. average number of piglets per litter closely tracked trends for these producers (table 5). The number of farrowings per breeding animal per year has increased slightly, from 1.99 in 2008 to 2.01 in 2012, but also contributed to the increase in production, before declining in 2013 to 1.95.²¹

Table 5 Pigs per litter, by size of operation, United States, 2008–13 (number)

Size group	2008	2009	2010	2011	2012	2013
1-99	7.6	7.4	7.7	7.5	7.5	7.8
100-499	8.2	8.1	8.3	8.3	8.4	8.6
500-999	8.4	8.5	8.7	8.9	9.0	9.1
1,000-1,999	9.0	9.1	9.4	9.3	9.4	9.6
2,000-4,999	9.4	9.6	9.7	9.9	10.0	10.1
5,000 +	9.5	9.7	9.9	10.1	10.2	10.3
Average	9.4	9.6	9.8	10.0	10.1	10.2

Source: USDA, NASS, "Quarterly Hogs and Pigs," December 2008, 2009, 2010, 2011, and 2012.

Note: Annual average from December of the previous year.

Number and Concentration of Firms

Swine Production

There were 68,300 U.S. swine producers in 2012. More than two-thirds of these producers had less than 100 hogs. Operations with 2,000 or more hogs accounted for only 13 percent of all operations but accounted for 87 percent of inventory (table 6). Over the last five years, swine production has continued its gradual trend to increasing concentration, with substantial declines in the number of producers in the two smallest size categories and increases in the number of producers in the two largest size categories.

Between 1992 (the date of the previous Industry and Trade Summary on live swine and pork)²² and 2004, the number of swine producers in the United States fell by more than 70 percent.²³ The number of producers has continued to decline since that time. Between 2008 and 2012, the number of operations declined a further 6.6 percent. The share of swine produced by the largest producers—those with 5,000 or more swine—has increased only slightly over the last five years. Operations with over 5,000 swine accounted for 60 percent of the total U.S. inventory of swine in 2008 and 62 percent in 2012.²⁴

However, the industry is even more concentrated in terms of ownership. Because of continuing integration in the swine industry, many operators are contract growers who do not own the swine they produce. Based on ownership, during 2008–12 the number of operations declined in

²¹ USDA, NASS, "Quarterly Hogs and Pigs," December 2008, 2009, 2010, 2011, 2012, and 2013.

²² Industry and Trade Summary: *Live Swine and Fresh, Chilled, or Frozen Pork*, USITC Publication 2511 (AG-5), March 1992.

²³ Key and McBride, *The Changing Economics of U.S. Hog Production*, 2007, 27.

²⁴ USDA, NASS, *Farms, Land in Farms, and Livestock Operations 2008 Summary*, February 2009, 18; USDA, NASS, *Farms, Land in Farms, and Livestock Operations 2012 Summary*, February 2013, 19. For the 2007 Agricultural Census, the NASS made efforts to increase the awareness and coverage of the census and made changes to its methodology. Data on the number of operations prior to 2007 are not directly comparable to later data.

Table 6 Number of U.S. producers and share of inventory by size group, 2008–12

Size group	2008	2009	2010	2011	2012
Number					
1–99	50,680	50,400	49,000	49,400	48,700
100–499	6,740	6,100	5,200	5,100	5,000
500–999	3,490	3,200	2,800	2,400	2,300
1,000–1,999	3,950	3,550	3,650	3,400	3,300
2,000–4,999	5,370	5,250	5,350	5,500	5,700
5,000 or more	2,920	2,950	3,100	3,300	3,300
Total	73,150	71,450	69,100	69,100	68,300
Share of inventory (percent)					
1–99	0.9	0.9	0.8	0.8	0.8
100–499	2.5	2.3	2.1	2.0	1.9
500–999	3.5	3.3	3.1	2.7	2.6
1,000–1,999	8.0	7.5	8.0	7.5	7.3
2,000–4,999	24.0	24.0	25.0	24.9	25.5
5,000 or more	61.1	62.0	61.0	62.1	61.9

Source: USDA, NASS, *Farms, Land in Farms, and Livestock Operations*, annual summaries, 2009–14.

Table 7 Number of swine operations and percent of inventory by size category of ownership, 2008 and 2012

Size category	Number of operations		Percent of inventory	
	2008	2012	2008	2012
Head				
1–99	50,610	48,900	1.0	0.9
100–499	5,870	4,400	2.4	1.8
500–999	2,380	1,700	2.4	1.8
1,000–1,999	2,160	1,800	4.5	3.7
2,000–4,999	2,350	2,100	10.7	9.1
5,000–9,999	705	630	7.4	7.0
10,000–19,999	365	345	7.4	7.2
20,000–49,999	185	180	8.5	8.5
50,000 or more	135	145	55.7	60.0
Total	64,760	60,200	100.0	100.0

Source: USDA, NASS, *Farms, Land in Farms, and Livestock Operations: 2009 Summary*, February 2010, 22; USDA, NASS, *Farms, Land in Farms, and Livestock Operations: 2012 Summary*, February 2013, 19.

every size category except for the largest – operations that own 50,000 or more head. In 2008, the 135 operations that each owned 50,000 or more swine accounted for 56 percent of the U.S. inventory of swine (table 7).²⁵ In 2012, the 145 operations that each own 50,000 or more swine accounted for 60 percent of the U.S. inventory of swine.²⁶

Pork Processing

Pork Processing involves two types of operations; hog slaughter (also called packing) and firms that engage in further processing of meat from carcasses. There were 606 U.S. federally

²⁵ USDA, NASS, *Farms, Land in Farms, and Livestock Production 2008 Summary*, February 2009, 16.

²⁶ USDA, NASS, *Farms, Land in Farms, and Livestock Production 2012 Summary*, February 2013, 19.

inspected hog slaughter plants operating in 2013, a slight decline from 618 plants in 2008. Some 111.2 million hogs were slaughtered in the United States in 2013, down 3.6 percent from 115.4 million in 2008.²⁷ Most hog slaughter plants are small: more than one-half (374 in 2013) of the federally inspected plants slaughter less than 1,000 hogs per year. These smaller plants accounted for only about 0.1 percent of all U.S. hogs slaughtered in each year of the five-year period. Over this period, there has been a gradual decline in the number of plants in this smallest size category. Conversely, throughout this period, there were 12 plants that each slaughtered 4 million or more hogs annually, and these plants accounted for over one-half of the total number of hogs slaughtered in each year (table 8).²⁸ Meat packing has remained a very concentrated industry throughout the period examined, in terms of ownership. In 2008, the four largest hog processing firms slaughtered approximately 65 percent of all hogs slaughtered in federally inspected facilities. The four-firm concentration ratio has ranged between 63 and 65 percent since 2007, and was 64 percent in 2011, the latest year for which information was available.²⁹

Table 8 Number of head slaughtered by plant size, 2008–13

Plant size	2008	2009	2010	2011	2012	2013
Thousand head	Million head					
Less than 1	0.13	0.13	0.12	0.12	0.12	0.12
1–10	0.32	0.29	0.33	0.36	0.38	0.40
10–100	2.58	2.57	2.17	1.98	1.89	2.02
100–250	1.49	1.75	2.24	2.18	2.16	2.09
250–500	4.21	3.84	2.8	2.86	2.4	2.65
500–1,000	3.11	3.09	3.35	3.33	3.47	2.92
1,000–2,000	4.92	3.85	4.85	4.9	3.86	5.85
2,000–3,000	28.51	27.83	26.86	27.09	30.1	27.66
3,000–4,000	7.05	7.25	3.86	3.9	3.85	3.85
4,000 or more	63.1	62.02	62.75	63.25	64.05	63.69
Total	115.42	112.61	109.31	109.96	112.27	111.25

Source: USDA, NASS, *Livestock Slaughter Annual Summaries*, 2009–2013.

Capacity utilization has generally declined over the past five years. Slaughter capacity has expanded, while slaughter has not. In November 2013, the estimated daily slaughter capacity in the United States was 446,275 hogs, up 10 percent from 445,800 in November 2008.³⁰ As shown in table 8, the number of swine slaughtered declined slightly over 2008–13.

In contrast with the situation with hog slaughter plants, during 2008–12, the number of firms that process meat from carcasses grew. In 2008, there were another 1,483 firms involved in

²⁷ USDA, NASS, *Livestock Slaughter, 2008 Summary*, March 2009, 54; USDA, NASS, *Livestock Slaughter, 2012 Summary*, April 2013, 56. The total number of hogs slaughtered includes federally inspected facilities, other commercial operations, and on-farm slaughter.

²⁸ USDA, NASS, *Livestock Slaughter, 2012 Summary*, April 2013, 60.

²⁹ USDA Grain Inspection, Packers and Stockyards Administration, *Packers and Stockyards Program Annual Report, 2012*, March 2013, 35.

³⁰ AMI, *Meat and Poultry Facts 2013*, 18; AMI, *Meat and Poultry Facts 2008*, 24.

producing meat from carcasses (including both pork and other meats). In 2012, the number of such firms increased to 1,502.³¹

Presence of Multinational Firms

In 2012, the five largest firms accounted for approximately 62 percent of U.S. slaughter capacity.³² The five largest pork producers in the United States are Smithfield Foods Inc., Tyson Foods Inc., JBS USA LLC, Hormel Foods Corp., and Cargill Inc. All of these producers are vertically integrated into swine and pork production, and market a variety of products. All also participate in markets for other proteins. Back in 2008, the five largest pork producers in the United States accounted for approximately 65 percent of U.S. slaughter capacity.³³

Smithfield Foods (headquartered in Virginia) has subsidiaries in France, Poland, Romania, and the United Kingdom, and joint ventures in Brazil, China, Mexico, and Spain.³⁴ Tyson Foods (Arkansas), better known for its poultry production, has pork production facilities or joint ventures in Brazil, China, India, and Mexico.³⁵ JBS USA (Colorado) is currently the third-largest pork producer in the United States.³⁶ With its 2009 purchase of Pilgrim's Corp., a leading U.S. poultry producer, JBS USA also became the second-largest poultry producer and the third-largest beef producer in the United States.³⁷ Hormel Foods (Minnesota) has subsidiaries that operate joint ventures or licensee production operations in Australia, China, Denmark, England, Japan, Korea, Mexico, Panama, and the Philippines.³⁸ Cargill (Minnesota) operates two hog processing facilities in the United States, and has employees in 66 countries.³⁹

Foreign Investment in the U.S. Industry

Two of the five largest U.S. pork producers have been purchased by foreign firms since 2007. In 2007, JBS USA's predecessor corporate entity, Swift Foods Co., was bought by the Brazilian firm JBS S.A. Acquisition of Swift Food's beef and pork production facilities made JBS S.A. the world's largest beef packer.⁴⁰ Moreover, JBS S.A. is the largest producer of animal proteins in the world, with production facilities in Argentina, Australia, Italy, Mexico, Paraguay, Russia, and China (leather), as well as the United States (including in Puerto Rico) and Brazil.⁴¹ In Swift Foods, JBS S.A. acquired both a well-known brand with established sales and distribution networks in

³¹ USDOL, BLS, *Detailed Statistics by Industry for the United States North American Industry Classification System (NAICS) 31162, "Meat Processed from Carcasses."*

³² American Meat Institute, *Meat and Poultry Facts, 2013*, 18.

³³ American Meat Institute, *Meat and Poultry Facts, 2008*, 24.

³⁴ Smithfield Foods, <http://www.smithfieldfoods.com/>.

³⁵ Tyson Foods, <http://www.tyson.com/>.

³⁶ JBS S.A <http://www.jbssa.com/>.

³⁷ The Pig Site, "CME: JBS Swift Confirms Purchase of Pilgrim's Pride," September 17, 2009, <http://www.thepigsite.com/swinenews/22018/cme-jbs-swift-confirms-purchase-of-pilgrims-pride>.

³⁸ Hormel Foods, <http://www.hormelfoods.com/>.

³⁹ Cargill, <http://www.cargill.com/>.

⁴⁰ Barreto, Elzio, *Reuters*, "Brazil's JBS-Fribói to Buy Swift for \$225 mln," May 29, 2007.

⁴¹ JBS S.A <http://www.jbssa.com/>.

North America, as well as access to the Chinese, Japanese, and Korean markets that were previously closed to fresh beef and pork from Brazil due to phytosanitary concerns.⁴²

More recently, in September 2013, Smithfield Foods was purchased by Hong Kong-based Shuanghui International Holdings (Shuanghui), the majority shareholder of Henan Shuanghui Development, China's largest meat processor.⁴³ Acquisition of Smithfield Foods provided Shuanghui with access to a global brand with well-known standards for quality and food safety and expertise in a wide variety of processed products.⁴⁴ Shuanghui also gained the ability to source pork from the largest U.S. producer for sale into the world's largest pork-consuming market—where Chinese consumers reportedly distrust domestic producers.⁴⁵ The purchase also capped a long-term move by Smithfield Foods away from using ractopamine in its operations, making it eligible to reach the Chinese market, as Smithfield Foods first shipped pork to China in 2007. In 2012, Smithfield began processing only ractopamine-free pork at its Clinton, NC, facility. In early 2013, a second facility, in Tar Heel, NC, began processing only ractopamine-free pork. Together, these two facilities processed about 10 percent of all U.S. pork.⁴⁶ In May 2013, shortly before the acquisition by Shuanghui was announced, Smithfield Foods announced that a planned shift of another facility to ractopamine-free pork would make more than half of its pork production ractopamine-free.⁴⁷

Vertical and Horizontal Integration

Historically, most U.S. production was undertaken by producers that engaged in all phases of swine production, termed “farrow-to-finish” operations. Increasingly, swine producers specialize in only a subset of the production phases. Farrow-to-finish producers accounted for 65 percent of finished hogs marketed in 1992, but only 18 percent of finished hogs marketed in 2004.⁴⁸ As swine producers have become more specialized, their numbers have declined, but average herd sizes have increased. The number of swine producers fell more than 70 percent between 1992 and 2004, from over 240,000 to approximately 75,000 operators.⁴⁹ As shown in table 7, the number of swine producers declined a further 6.6 percent between 2008 and 2012, with most of the decline having occurred within the smallest size category of 1–99 animals. Moreover, as the smaller operations are more likely to be farrow-to-finish producers, the decline in the number of producers has meant a continuation of the shift towards more specialized finishing operations.

⁴² Jelmayer, Rogerio, *The Wall Street Journal, Market Watch*, “Brazil's JBS buys Swift Foods for \$1.4 Billion,” May 29, 2007.

⁴³ Smithfield, “Shuanghui International and Smithfield Foods Complete Strategic Combination, Creating a Leading Global Pork Enterprise,” news release, September 26, 2013, <http://investors.smithfieldfoods.com/releasedetail.cfm?ReleaseID=793522>; MeatingPlace.com, “Smithfield Confirms in Agreement to sell to Chinese Firm for \$7 Billion” May 29, 2013, <http://www.meatingplace.com/Industry/News/Details/42331>.

⁴⁴ Shuanghui company website, <http://www.shuanghui-international.com/site/>, accessed December 9, 2013.

⁴⁵ Coleman, Zach, *USA Today*, “What Smithfield Acquisition Means for China's Consumers,” May 29, 2013.

⁴⁶ Smithfield Foods press release, “Smithfield Well Positioned to Meet Rising Demand for Ractopamine-free Pork,” February 21, 2013.

⁴⁷ Reuters, “Half of Smithfield's U.S. Pork Will Soon be off Ractopamine – CEO,” May 14, 2013.

⁴⁸ Key and McBride, “The Changing Economics of U.S. Hog Production,” 2007, 6.

⁴⁹ *Ibid.*, 5.

An increasing number of swine are owned by pork producers (packers). The share of market hogs that are owned by packers and raised under contract increased from 21.4 percent in 2005 to 25.7 percent in 2009.⁵⁰ Official statistics of the U.S. Department of Agriculture's (USDA) Agricultural Marketing Service indicate that the total share of slaughtered barrows and gilts owned by packers (including sales for slaughter by packers) increased slightly, from 30.6 percent in 2008 to 32.3 percent in 2012 and 33.4 percent in 2013.⁵¹

Employment, Earnings, and Productivity

The U.S. Department of Labor (USDOL) Bureau of Labor Statistics (BLS) publishes statistics on employment in the swine industry and in the meat packing and processing industry.⁵² However, BLS statistics do not include the opportunity costs of labor by the owner-operator. As most swine operations are small, statistics reported by the BLS may not accurately portray trends in the industry. In 2012, the BLS reported employment statistics for 2,273 U.S. swine farms, up from 2,229 in 2008. Reported employment increased by 11 percent (from 26,665 to 29,489), but this may be partly due to the increase in the number of establishments reported. Average reported annual wages for these establishments increased from \$28,983 in 2008 to \$32,992 in 2012, which may be attributed to an increase in labor productivity.⁵³

Swine Production

Labor accounts for a small and declining share of overall costs of swine production in the United States. However, labor costs are a larger share of total costs for farrow-to-finish operators than for feeder-to-finish operators, because of both the cost of feeder pigs and the cost savings gained from specialization.⁵⁴ For feeder-to-finish operations, the cost of labor is predominantly the opportunity cost of unpaid labor provided by the operator, but for farrow-to-finish operations, hired labor accounts for a larger share of total cost. The cost of labor declined over the 2008–12 period for both types of operators, both per hundred pounds of weight gain and as a share of total costs.⁵⁵ Improvements in genetics or production practices that improve weight gain or decrease production time would tend to lower labor costs.

Farrow-to-finish operators on average lost money in 2008 and 2009, but have been profitable since that time. Feeder-to-finish operators on average lost money in 2009, and were profitable for the remainder of the 2008–13 period.

⁵⁰ Grimes and Plain, *U.S. Hog Marketing Contract Study, January 2009*, 1–2.

⁵¹ Calculations by USITC staff from USDA, *AMS Weekly National Direct Swine Report, 2008–12*. A barrow is a castrated male pig raised for slaughter. A gilt is an immature female pig.

⁵² Swine and pork production includes the North American Industrial Classification System (NAICS) category 112210, Hog and Pig Farming; as well as parts of categories 311611, Animal (except Poultry) Slaughtering and 311612, Meat Processed from Carcasses. BLS statistics on the meat packing industry includes cattle as well as swine slaughter, and also includes statistics on further processing beyond slaughter.

⁵³ USDOL, BLS, *Quarterly Census of Employment and Wages, 112210, Hog and Pig Farming*.

⁵⁴ Farrow-to-finish producers raise swine throughout the entire life cycle, from breeding, gestation, birth of the piglets (farrowing), weaning, and feeding, to “finishing” hogs for slaughter. Feeder-to-finish producers specialize in a subset of production operations, raising “feeder pigs,” typically 40–60 pounds, through finishing.

⁵⁵ USDA, ERS, Commodity Costs and Returns, <http://www.ers.usda.gov/data-products/commodity-costs-and-returns.aspx>, accessed August 27, 2014.

U.S. inflation-adjusted demand for pork changed little over 2008–12.⁵⁶ U.S. per capita pork consumption increased slightly in 2009, as U.S. pork exports declined from the high reached in 2008 and more pork entered the U.S. domestic market. As a result of the increased pork supply, live hog prices fell by an average of 13 percent in 2009, leading to U.S. swine producers' largest losses over the period, even though U.S. swine producers' average cost of production declined by 8.2 percent, due mainly to a decline in feed prices from 2008.⁵⁷ In 2013, demand increased, possibly due to below-average temperatures for much of the year.⁵⁸

Since 2009, U.S. pork producers have benefited from increasing export demand and from prices that have declined relative to competing meat products. U.S. pork exports increased each year 2009–12, and average retail prices increased each year as well. However, in 2013, U.S. pork exports declined to a level below that observed in 2011 and 2012, as domestic consumption rose.

Average retail prices for pork products rose more slowly than retail beef prices 2008–12, but more rapidly in 2013. Average retail pork prices increased 20 percent from January 2008 to December 2012, compared to 24 percent for average beef prices, but then increased a further 12 percent in 2013, compared to a 7 percent increase for beef. Average retail prices for poultry cuts increased 16 percent January 2008 to December 2012 with no further increase through December 2013.⁵⁹

Pork Processing

Wages and benefits accounted for an ever smaller share of the value of product shipment in the meat packing industry. The value of product shipments by the animal (except poultry) slaughtering and processing industry increased 22.6 percent between 2008 and 2011 (the latest year for which statistics are available).⁶⁰ Over the same period, the number of production workers was virtually unchanged (down 0.2 percent) and payroll costs increased 2.6 percent. In 2008, wages were equivalent to about 8 percent the value of product shipments, and total employee compensation to about 11 percent. In 2011, wages were equivalent to about 7 percent of the value of product shipments by the meat packing industry, and total employee compensation was equivalent to about 11 percent.⁶¹

The retail price of pork can be broken down into the net farm value, the farm-to-wholesale spread, and the wholesale to retail spread. The farm value includes swine producer costs plus any profits. This figure varied substantially over 2008–13, mainly driven by feed costs. The farm-to-wholesale spread includes processing costs plus packer profits. Processing costs vary with

⁵⁶ CME Group, Daily Livestock Report, December 18, 2012.

⁵⁷ USDA, ERS, Pork Values and Price Spreads, <http://www.ers.usda.gov/topics/animal-products/animal-production-marketing-issues/retail-meat-prices-price-spreads.aspx>, accessed September 27, 2013; USDA, ERS, "Commodity Costs and Returns," <http://www.ers.usda.gov/data-products/commodity-costs-and-returns.aspx>. accessed

August 29, 2013.

⁵⁸ Daily Livestock Report, March 12, 2014.

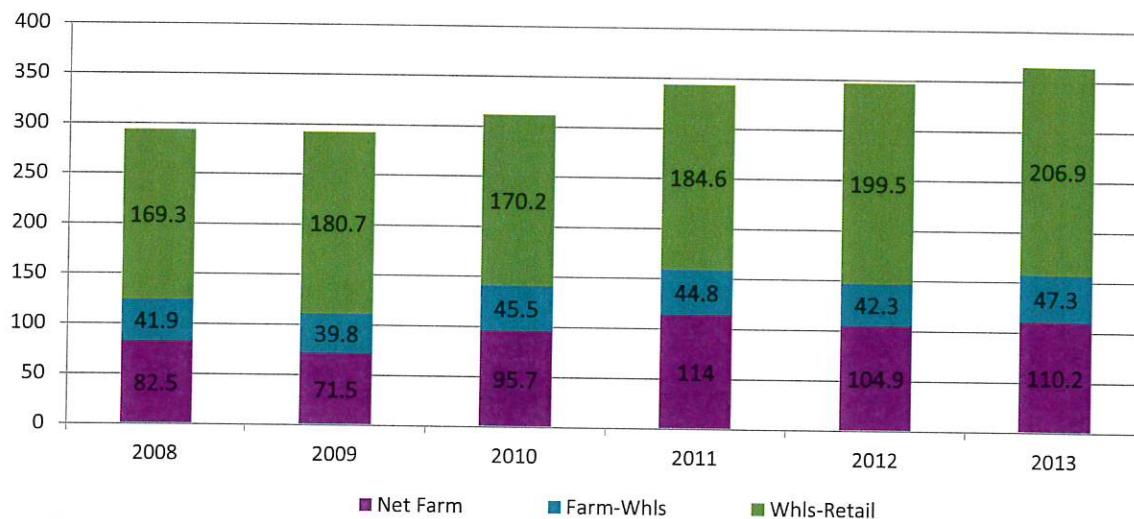
⁵⁹ USDA, ERS, Historical Monthly Price Spread Data for Beef, Pork, Broilers, February 20, 2014.

⁶⁰ Comparable data for pork packers alone are unavailable. Data on the meat packing industry is presented in Appendix A.

⁶¹ U.S. Census Bureau, *Annual Survey of Manufacturers: 2009 and 2008*; U.S. Census Bureau, *Annual Survey of Manufacturers: 2011*.

capacity utilization and any changes in technology, but would be expected to vary much less than costs for swine producers. The wholesale-to-retail spread generally rose over the period (figure 2). Pork packers were profitable, on average, in three of the five years during 2008–12. Packers lost money in 2009, as the farm-to-wholesale spread shrank to its lowest value over the period, and lost money in 2012, as the wholesale to retail spread increased (see tabulation).

Figure 2 Pork retail equivalent net farm value and price spreads, 2008–13 (cents per pound)



Source: USDA, ERS, Meat Price Spreads Data, August 19; 2014.AMI, Meat and Poultry Facts, 2012, 21

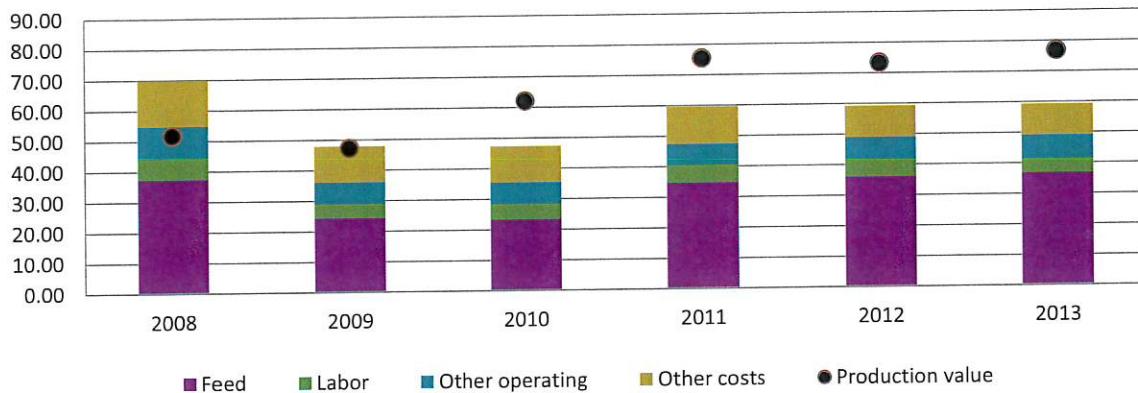
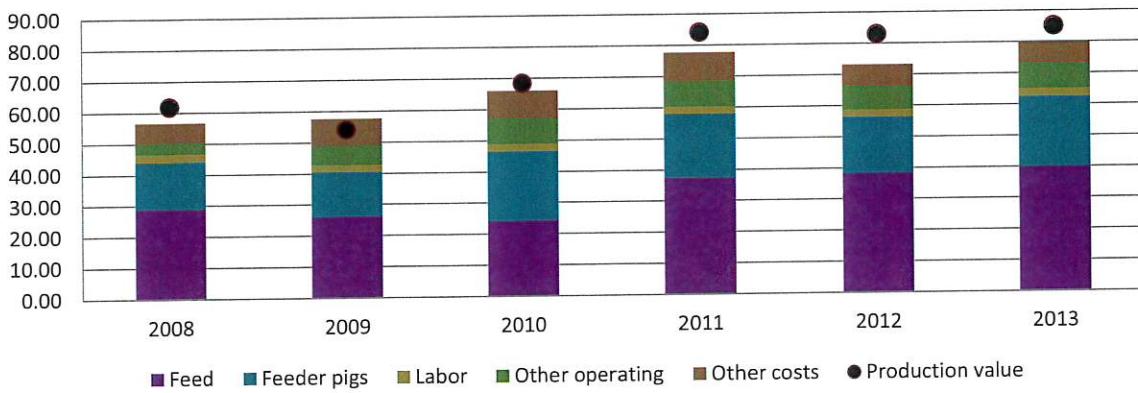
Pork packer margins, 2008–12 (dollars per head)

Year	Margin
2008	2.44
2009	-2.57
2010	11.19
2011	6.51
2012	-2.82

Source: AMI, Meat and Poultry Facts, 2012, 21.

Swine Production Costs

Economic returns for both farrow-to-finish and feeder-to-finish operations increased on average over the 2008–12 period, although returns were negative for producers of both types in 2009. Since 2009, net returns for feeder-to-finish producers (on a per hundredweight basis) increased through 2012, and declined but were still positive in 2013. Net returns for farrow- to-finish operators peaked in 2010, and have since declined (figure 3).

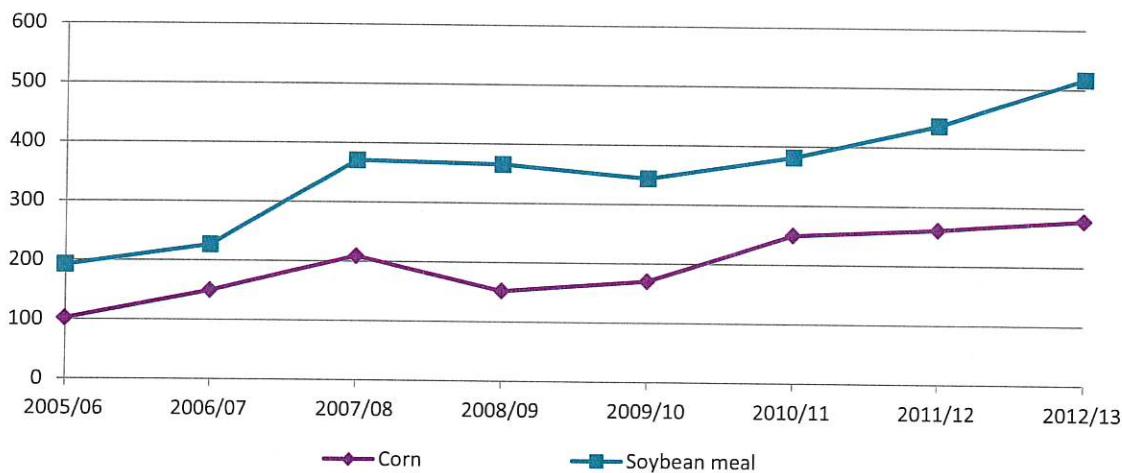
Figure 3 Costs and returns per hundred-pound weight gain, 2008–13**Farrow-to-finish operations****Feeder-to-finish operations**

Source: USDA, ERS, "Commodity Costs and Returns" (accessed August 27, 2014).

For U.S. swine producers, feed costs are the single greatest component of total cost, and during 2008–12, the share of feed costs in total costs increased for both farrow-to-finish and feeder-to-finish operators. Feed costs for both farrow-to-finish and feeder-to-finish producers declined on an absolute basis 2008–10, but increased substantially in 2011 and 2012. Between 2009 and 2012, the cost of feed rose from 51 percent of total costs to 61 percent for farrow-to-finish operations, and rose from 45 percent of total costs to 52 percent for feeder-to-finish operations. The share of feed costs in total costs was lower for feeder-to-finish operations because of the cost of feeder pigs.

Corn is typically the major source of energy in swine feed, and soybean meal is the major source of protein. The cost of producing swine largely reflects the cost of these key feed ingredients. Corn and soybean meal prices increased to historic highs in marketing year 2007/08, driving up the cost to raise hogs that came to market in 2008 and 2009 (figure 4). The price of these key feed ingredients then fell before rising again through 2012/13.

Figure 4 Corn and soybean meal prices, crop years 2005/06–2011/12 (dollars per metric ton)



Source: USDA, ERS, Feedgrains Yearbook, table 12; Oil Crops Yearbook, table 4 (accessed August 28, 2014).

Note: The crop years are September–August for corn and October–September for soybean meal.

Feed Efficiency

Feed efficiency and average daily weight gain for the typical U.S. swine producer have improved over the past five years. Recent research sponsored by the National Pork Board measured efficiency metrics for a panel of companies and farms that made up approximately 35 percent of swine production in the United States during 2007–12. Finishing weight and average daily gain increased for both producers engaged in the finishing phase only, and for wean-to-finish producers. Feed conversion, measured as the ratio of weight of feed to weight gain selected measures of swine productivity, 2008–12, improved for both finishers and wean-to-finish producers, as shown in table 9.⁶²

⁶² Stalder, Kenneth J., "Pork Industry Productivity Analysis," 2013.

Table 9 Number of swine operations and percent of inventory by size category of ownership, 2008 and 2012

Measure	2008	2009	2010	2011	2012
Finisher phase					
Finishing weight (pounds)	261.2	265.0	268.7	271.5	269.2
Average daily gain (pounds)	1.69	1.75	1.76	1.81	1.81
Feed conversion (feed/gain)	2.82	2.76	2.77	2.71	2.68
Wean-to-finish average					
Finishing weight (pounds)	261.7	264.2	270.5	273.6	270.1
Average daily gain (pounds)	1.54	1.54	1.54	1.57	1.57
Feed conversion (feed/gain)	2.51	2.54	2.52	2.50	2.50

Source: Stadler, "Pork Industry Productivity Analysis," August 2013, 6.

Ractopamine

Ractopamine (ractopamine hydrochloride)⁶³ is a feed additive that increases feed efficiency and promotes gain of muscle over fat. It is commonly used in finishing operations in the United States, but is not approved for use in some major export markets. Ractopamine is added to feed in the finishing stage, for not more than 6 weeks. It can be included in feed up until slaughter. There is no recommended withdrawal time, as degradation products are rapidly eliminated.

According to literature from producer Elanco, ractopamine use reduces feed requirements by up to 6 percent, and increases weight gain by up to 10 percent, by increasing feed efficiency. It increases production of lean muscle mass by 25 to 37 percent.⁶⁴ In order to obtain the performance benefits, feed should contain at least 16-percent protein and sufficient lysine.⁶⁵ The use of ractopamine in finishing swine has been estimated to add approximately \$6 per head in net value.⁶⁶

The Codex Alimentarius approval process for ractopamine was lengthy and contentious. A proposal to adopt a maximum residue limit (MRL) for ractopamine was submitted for approval by the Codex Committee for Residues of Veterinary Drugs in Foods in July 2008. The proposal was based on a risk assessment conducted by the Joint Food and Agriculture Organization/World Health Organization (FAO/WHO) Expert Committee on Food Additives (JECFA). The proposal advanced to step 8 of the Codex Committee's eight-step process but then remained there throughout 2009–11, largely because of concerns raised by China and the EU. In July 2012, the Codex Committee narrowly approved the establishment of an MRL for ractopamine of 10 parts per billion (ppb) for muscle cuts of beef and pork.⁶⁷

Continuing to express reservations about ractopamine, China submitted data to JECFA in 2009 from three studies on ractopamine residues. Data from a fourth study were submitted in 2010.

⁶³ Benzenemethanol, 4-hydroxy-alpha-[3-(4-hydroxyphenyl)-1-methylpropylaminomethyl]- hydrochloride (CAS number 90274-24-1, molecular formula C18H23NO3HCl, molecular weight 337.85).

⁶⁴ Sterle, *The Facts about Paylean: Ractopamine for Swine*, n.d.

⁶⁵ Elanco, "Paylean" 2014.

⁶⁶ Meat Trade News Daily, "China - Cleaning up the international animal feed industry," March 20, 2013.

⁶⁷ The limits established by the FDA are 30 ppb for beef and 50 ppb for pork.

The MRL recommended by JECFA was based on residue data collected in studies on swine and an estimated daily intake of different tissues. The Chinese delegation expressed concern with the residue data because of differences in pig breeds and production conditions in China, and with residue levels in lung, stomach, heart, and large and small intestine tissues, which are more widely consumed in China. In a 2010 report, however, the JECFA concluded that estimated daily intake of ractopamine in the studies provided by the Chinese delegation, adjusted for consumption data provided by the Chinese Centre for Disease Control, did not exceed the acceptable daily intake (ADI) that had been previously recommended.⁶⁸

The European Food Safety Authority reviewed the results of the studies conducted on the safety of ractopamine, and in 2009 concluded that data from existing studies were not sufficient to establish an acceptable daily intake (ADI) for ractopamine. The panel concluded that without an acceptable ADI, an MRL could not be established.⁶⁹

Dried Distiller's Grains

Another change in swine production in recent years has been the use of distiller's grains in feed (box 3). Dried distiller's grains (DDG) and dried distiller's grains with solubles (DDGS) are by-products of corn ethanol production. DDGS can be used in rations for swine in rates up to 30 percent, primarily as an alternative to corn. However, rates of over 20 percent causes pork fat to be less firm.⁷⁰

Box 3 Dried distiller's grains with solubles in swine rations

In the production of ethanol from corn, sugar is fermented to produce alcohol, which is then removed through distillation. The remaining product is distiller's grains (DG). The solids can be dried after separation from the liquids, producing dried distiller's grains (DDG) or dried with the syrup, to yield dried distiller's grains with solubles (DDGS). One bushel of corn (56 pounds) will produce about 2.7 gallons of ethanol and 18 pounds of DDGS at 88–90 percent dry matter. DDGS is about 25–35 percent protein, and a kilogram of DDGS contains more gross energy than a kilogram of corn. In swine rations, 100 pounds of DDGS replaces about 88 pounds of corn and 10 pounds of soybean meal.⁷¹ DDGS can be included in swine feed at rates up to 30 percent of dry matter, but at over 20 percent, it reduces the quality of products such as bacon.⁷²

⁶⁸ That ADI was 0.1 µg per kg of body weight, and the recommended MRLs were 10 µg per kg for pork muscle and fat, 40 µg per kg for pork liver, and 90 µg per kg for pork kidney. Joint FAO/WHO Expert Committee on Food Additives, *Residue Evaluation of Certain Veterinary Drugs: Meeting 2010 – Evaluation of Data on Ractopamine Residues in Pig Tissues*, 2010, 1, 38.

⁶⁹ European Food Safety Authority, *Safety evaluation of ractopamine: Scientific Opinion of the Panel on Additives and Products or Substances used in Animal Feed*, The EFSA Journal (2009) 1041, 1-52.

⁷⁰ U.S. Grains Council, *A Guide to Distiller's Dried Grains with Solubles (DDGS)*, 2012, 6. Use of DDGS in swine diets also may require the addition of some amino acids to the ration, and may increase excretion of nitrogen and phosphorus. U.S. Grains Council, *A Guide to Distiller's Dried Grains with Solubles (DDGS)*, 2012, chapter 21, 1.

⁷¹ Plain, "Feeding Distiller Grains to Hogs," Livestock Marketing Information Center, Fall 2006, 4.

⁷² Hoffmal and Baker, USDA, ERS, "Estimating the Substitution of Distiller's Grains for Corn and Soybean Meal in the U.S. Feed Complex," October 2011, 7; National Hog Farmer, "How Much Distiller's Grain is Too Much," February 29, 2012, 1.

Other Elements of Cost

For feeder-to-finish producers, the cost of feeder pigs is the next-largest element of cost after feed. For the typical feeder-to-finish operator, the cost of feeder pigs accounted for about one-quarter of total costs. The share of the cost of feeder pigs in total costs for feeder-to-finish producers declined through 2012, but increased slightly in 2013. In 2008, feeder pigs accounted for 27 percent of total costs for these producers. This share peaked at 34 percent in 2010 and was 28 percent in 2013.

As mentioned earlier, the share of total costs accounted for by labor, both hired labor and unpaid opportunity cost, is higher for operations that farrow pigs than for feeder-to-finish operations. Other allocated costs, for capital recovery on equipment and allocated general farm overhead, also account for a greater share of total costs for operations that farrow pigs (table 10):⁷³

Table 10 Costs of U.S. swine producers, dollars per hundred-weight gain, 2008–13

	2008	2009	2010	2011	2012	2013
Farrow to finish producers						
Feed	37.34	24.26	23.24	34.67	35.93	36.72
Hired labor	3.38	3.77	3.98	4.06	4.29	4.62
Opportunity cost of labor	7.17	3.25	3.06	2.96	2.92	2.96
Capital cost of equipment	11.91	10.44	10.39	10.69	8.73	8.98
All other costs	10.08	6.09	6.51	7.09	7.18	5.95
Total costs	69.88	47.81	47.18	59.47	59.05	59.23
Value of production	51.66	47.12	62.06	75.43	73.34	76.82
Value of production less total costs	-18.22	-0.69	14.88	15.89	14.29	17.59
Feeder pig to finish producers						
Feed	28.83	26.11	24.19	37.35	38.31	39.94
Feeder Pigs	15.23	14.33	22.32	20.59	17.94	22.45
Hired labor	0.60	0.62	0.63	0.64	0.66	0.70
Opportunity cost of labor	2.04	1.74	1.74	1.73	1.78	1.82
Capital cost of equipment	4.98	7.43	7.55	7.90	5.56	5.71
All other costs	4.88	7.32	9.48	9.42	8.86	9.18
Total costs	56.56	57.55	65.91	77.63	73.11	79.80
Value of production	61.70	54.04	68.33	83.74	82.92	85.05
Value of production less total costs	5.14	-3.51	2.42	6.45	9.81	5.25

Source: USDA, ERS, U.S. hog production costs and returns per hundred-weight gain.

Note: All other costs includes costs of veterinary care, bedding, marketing, fuel, repairs, interest on operating capital, land, taxes, insurance, and general farm overhead.

Swine Research

The National Institute of Food and Agriculture (NIFA)—formerly the Cooperative State Research, Education, and Extension Service (CSREES) at the USDA—awards federal grants to researchers at land-grant and other universities and provides program leadership for research, education, and extension projects at state and local levels. Within NIFA, competitive grants are

⁷³ USDA, ERS, "Commodity Costs and Returns," <http://www.ers.usda.gov/data-products/commodity-costs-and-returns.aspx>, accessed August 29, 2013.

funded by the Agriculture and Food Research Initiative (AFRI). Over the past five years, research funded by AFRI included a wide variety of topics related to swine and pork production and marketing. Examples include a first draft of the genome of the domestic pig, research into the feed efficiency and metabolism of different lines of swine, improvements in artificial insemination technology, isolation of genes involved in responses to swine diseases, survival of pathogens in manure, the relationship of antimicrobial usage in swine production to food safety, genetic improvements in feed and reproductive efficiency, and persistence in the environment of hormones used to improve feed efficiency.

Other research coordinated through NIFA includes development and acceptance of branded pork products, effects on swine of aflatoxins in feed, effects of parity on the health of piglets, development of new vaccines for swine diseases, role of shipping stress on swine health, improvements in reproductive efficiency, transference of antibiotic resistance genes, use of DDGS in swine feed, effects of additives such as ractopamine on animal safety and production economics, effects on lean deposition and feed efficiency of different formulations and additives to swine feed, and effects of crowding of swine on feed efficiency.⁷⁴

The National Pork Board also funds research through the Pork Checkoff. Both U.S. pork producers and U.S. importers pay \$0.40 per \$100 of value when swine are sold or pork products are imported into the United States.⁷⁵ The funds are used for promoting the industry and to fund research. Research areas include: efficiency and productivity; swine health and welfare; pork quality and human nutrition; environmental impact; and producer, employee, and consumer safety.⁷⁶

U.S. swine production has recorded significant productivity gains since the publication of the previous Industry and Trade Summary on live swine and pork in 1992. As already noted, the number of farrowings per sow and the number of piglets per litter have both increased. Feed efficiency has also increased. The cost of labor per hundred-weight gain has generally declined. Some of the productivity gains are due to genetic improvements in swine. Others have more to do with production practices.

Changes in production practices that have contributed to productivity improvements include increases in the average number of swine per farm, the shift away from farrow-to-finish operations to more specialized production phases, more widespread use of artificial insemination, a shift to all-in all-out production, and a shift to more specialized feeding.⁷⁷ These changes allowed U.S. swine and pork producers to produce more pork with fewer breeding sows and increase feed efficiency.

⁷⁴ USDA, National Institute of Food and Agriculture, Agriculture and Food Research Initiative (AFRI), <http://www.nifa.usda.gov/nea/animals/animals.cfm>.

⁷⁵ National Pork Board, Pork Checkoff, <http://www.pork.org/AboutUs/default.aspx>.

⁷⁶ National Pork Board, Checkoff Funded Research Grants Listing, <http://www.pork.org/Research/3188/ResearchGrants.aspx>.

⁷⁷ In all-in all-out production, animals are moved into and out of facilities in distinct groups, in order to reduce the spread of disease.

Swine Marketing and Distribution

Marketing Methods and Distribution Channels

As the swine and pork industry in the United States has become more specialized, marketing channels for swine have also become more vertically integrated. The number of hogs purchased on the cash or spot market by the four largest hog slaughter firms fell sharply between 2009 and 2010, from 11.6 percent to 7.5 percent. In 2010, another 21.6 percent were raised in packer-owned farrowing operations.⁷⁸ The balance is generally purchased under either forward contracts or marketing agreements. Forward contracts are typically one-time contracts for a specific number of hogs to be delivered over a given time period. Marketing agreements usually cover a year or more.⁷⁹

The share of swine purchased for slaughter on the cash or spot market has continued to decline. The share of U.S. market hogs sold in the spot or cash market by producers other than packers declined from 8.6 percent in 2008 to 3.6 percent of all market hogs slaughtered in 2012.⁸⁰

Price Determination

Hogs are most commonly sold based on carcass quality attributes, rather than simply by live weight. For those firms that report to the USDA's Grain Inspection, Packers and Stockyards Administration (GIPSA), 76 percent of swine were sold on a carcass-weight basis in 2011, down from 87.8 percent in 2008. Purchases on a carcass-weight basis typically include a base price with premiums or discounts for carcass characteristics such as USDA grade, yield, or percentage of lean meat in the carcass.⁸¹ The majority of market hogs are sold under a forward contract or marketing agreement, with prices generally tied to either spot market prices for hogs or to pork prices. Although a relatively small share of hogs is purchased on the negotiated cash market, these sales determine the prices paid for a much larger number of hogs. In January 2009, 41 percent of hogs purchased for slaughter were purchased under hog or pork market formulas tied to the cash market. Another 8 percent of hogs were purchased using other market formulas.⁸²

Hog prices display significant seasonality, principally due to changes in the supply of market hogs throughout the year. Average prices peak in midsummer and typically are at their lowest point in midwinter. The Livestock Marketing Information Center has compiled seasonal price indices by dividing each month's national weighted-average base price by the annual average. The monthly average price index reaches a maximum of 1.12 in June and a low of 0.90 in November.⁸³

⁷⁸ USDA GIPSA, *Packers and Stockyards Program 2010 Annual Report*, March 2011, 65.

⁷⁹ USDA GIPSA, *Packers and Stockyards Program 2009 Annual Report*, March 2010, 65.

⁸⁰ Calculations by USITC staff from USDA, AMS *Weekly National Direct Swine Report*, 2008–12.

⁸¹ USDA, *Packers and Stockyards Program, 2009 Annual Report*, March 2010, 64.

⁸² Grimes and Plain, *U.S. Hog Marketing Contract Study*, January 2009, 1–2.

⁸³ CME Group, *Daily Livestock Report*, Vol. 8, No. 156, August 12, 2010.

U.S. Market

U.S. Consumption

Pork accounted for about 45 percent of all consumption of red meat (beef, veal, pork, and lamb) in the United States in 2013, on a retail-weight basis.⁸⁴ Total and per capita consumption of pork declined slightly over the 2008–13 period, but pork’s share of all red meat consumption has increased slightly.⁸⁵

Most pork consumed in the United States is purchased through retail sales. Analysis of data collected in the Continuing Survey of Food Intakes by Individuals (CSFII) found that 78 percent of U.S. pork is purchased at retail, 17 percent is purchased at a restaurant, and 5 percent at other locations.⁸⁶

Most pork is consumed as a processed product, rather than fresh.⁸⁷ Smoked ham accounted for the largest share of U.S. pork consumption, followed by sausage and bacon.⁸⁸ Processed pork consumed at home is more often eaten for breakfast or lunch, and fresh pork consumed at home is most often eaten for dinner.⁸⁹ Shares of per capita pork consumption, by preparation and product, are presented in figure 5.

Consumption Trends

U.S. red meat consumption fell 2008–13, but consumption of pork declined less than consumption of other red meats (beef, veal, and lamb). Hence, pork’s share of U.S. red meat consumption increased from 41.1 percent in 2008 to 44.8 percent in 2013 (table 11). U.S. domestic pork consumption rose in 2009, as less was exported and more entered the U.S. market in that year, but thereafter, consumption declined, before increasing in 2013. Total U.S. pork consumption fell less than 2 percent in 2008–13. The decline in per-capita consumption was greater, at 5 percent, as the U.S. population grew by 3 percent over this period.

⁸⁴ Calculated from USDA, ERS, Quarterly Red Meat, Poultry, and Egg Supply and Disappearance and Per Capita Disappearance, August 27, 2013, <http://www.ers.usda.gov/data-products/livestock-meat-domestic-data.aspx>.

⁸⁵ Ibid., August 26, 2014, <http://www.ers.usda.gov/data-products/livestock-meat-domestic-data.aspx>.

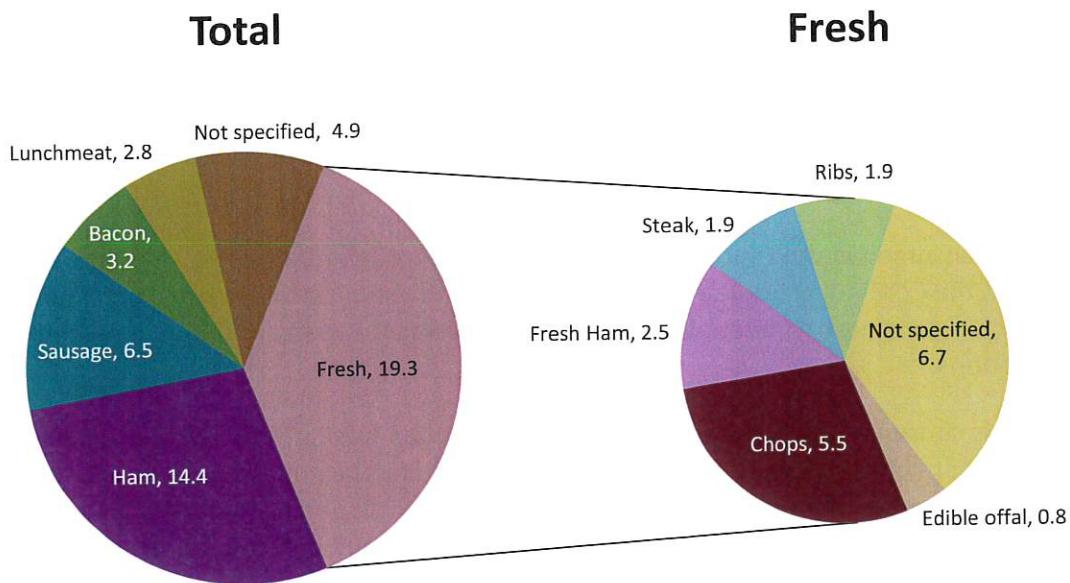
⁸⁶ Davis and Lin, *Factors Affecting U.S. Pork Consumption*, May 2005, 9.

⁸⁷ Processed pork products include products such as bacon, sausage, and smoked ham.

⁸⁸ Davis and Lin, *Factors Affecting U.S. Pork Consumption*, May 2005, 6. National Pork Board, *Quick Facts*, 2011, 19–20, 28.

⁸⁹ National Pork Board, *Quick Facts*, 2011, 19–27.

Figure 5 Annual per-capita pork consumption, processed and fresh (pounds)



Source: Davis and Lin, *Factors Affecting U.S. Pork Consumption*, 2005, 6.

Table 11 U.S. red meat disappearance, total and retail per capita, 2008–13

	2008	2009	2010	2011	2012	2013
Million metric tons						
Total Disappearance						
Beef & veal	12.4	12.2	12.0	11.6	11.7	11.6
Pork	8.8	9.0	8.7	8.3	8.4	8.7
Lamb & mutton	0.2	0.2	0.1	0.1	0.1	0.1
Total red meat	21.4	21.4	20.8	20.1	20.3	20.4
Kilograms						
Retail weight per capita						
Beef & veal	28.5	27.9	27.2	26.2	26.2	25.5
Pork	22.4	22.8	21.7	20.7	20.8	21.2
Lamb & mutton	0.5	0.5	0.4	0.4	0.4	0.4
Total red meat	51.4	51.1	49.3	47.3	47.4	47.3

Source: USDA, ERS, *Quarterly Red Meat, Poultry, and Egg Supply and Disappearance and Per Capita Disappearance*, August 27, 2013, <http://www.ers.usda.gov/data-products/livestock-meat-domestic-data.aspx>.

Note: "Disappearance" is calculated as production, minus exports, plus imports, and changes in storage volume.

"Disappearance" can be more accurately measured than "consumption."

Factors Affecting U.S. Consumption

In the United States, most pork is consumed at home, and most of that is consumed as processed products, rather than as whole muscle cuts of pork.⁹⁰ The CSFII during 1994–96 and

⁹⁰ Davis and Lin, *Factors Affecting U.S. Pork Consumption*, USDA, ERS, May 2005, 5, 9. National Pork Board, *Quick Facts*, 2011, 19–20. Processed pork includes products such as smoked ham, bacon, sausage, and hot dogs.

1998 found that about 78 percent of pork purchased in the United States was from retail stores for in-home consumption and that 62 percent of pork consumed was a processed product.⁹¹

The share of American's retail expenditures that goes to food for at-home consumption changed little over 2008–12. The share of retail expenditures on food away from home, as a share of all retail food expenditures peaked at 50 percent in 2006, compared to 47 percent in 2008 and 47 percent in 2012.⁹² However, the share of pork consumed away from home has been increasing. A survey by the National Pork Board found that between 1996 and 2001, the volume of pork in foodservice expanded twice as fast as foodservice volume overall.⁹³ A more recent study of meat sales in foodservice found that pork has been the fastest-growing protein in foodservice over the past two years, expanding at a compound annual growth rate of 2.6 percent over the past two years, compared to the 0.8 percent overall growth of proteins in foodservice.⁹⁴ The volume of pork used in foodservice in 2013 is estimated to be over 9 billion pounds carcass weight (4.19 million mt), or about one-half the total 2012 U.S. disappearance of pork.⁹⁵

Characteristics of Consumers

An analysis of U.S. pork consumption in 2005 found that pork consumption was highest in the Midwest, higher for rural than for urban consumers, higher among African Americans, and lower for Hispanics and the elderly. Consequently, as the population of the United States becomes more urban, aged, and Hispanic, per capita pork consumption is expected to decline.⁹⁶ However, a more recent survey conducted for the National Pork Board found that consumption of processed pork products was most often reported by men 55 years of age and over, and consumption of fresh pork was most often reported by both men and women age 55 and over.⁹⁷

Price

The net on-farm value of pork sold at retail increased from 82.5 cents per pound, retail equivalent, in 2008 to \$1.102 per pound in 2013, or by 33 percent. Over the same period, the average retail price of pork increased 24 percent, from \$2.94 to \$3.64 (table 12). In comparison, the consumer price index (CPI) for total food purchases for all U.S. urban consumers increased by 9 percent between 2008 and 2013, making pork relatively more expensive for U.S. consumers.⁹⁸ The increase in the average retail price of pork was slightly more than the

⁹¹ Davis and Lin, *Factors Affecting U.S. Pork Consumption*, USDA, ERS, May 2005, 8.

⁹² USDA, ERS, *Historical Food Sales*, <http://www.ers.usda.gov/data-products/food-expenditures.aspx>.

⁹³ National Pork Board, "Consumer Eating Trends: Pork in Foodservice, Pork in Retail," 5. Foodservice includes all businesses and institutions responsible for food served away from home.

⁹⁴ Technomic Inc. "Volumetric Assessment of Pork in Foodservice: 2013 Update," National Pork Board, August 2013, 21, 34.

⁹⁵ Technomic Inc. "Volumetric Assessment of Pork in Foodservice: 2013 Update," National Pork Board, August 2013, 21, 24, compared to USDA, ERS, *Quarterly Red Meat, Poultry, and Egg Supply and Disappearance and Per Capita Disappearance*, August 27, 2013, <http://www.ers.usda.gov/data-products/livestock-meat-domestic-data.aspx>.

⁹⁶ Davis and Lin, *Factors Affecting U.S. Pork Consumption*, USDA, ERS, May 2005, 1.

⁹⁷ National Pork Board, *Quick Facts*, 2011, 24.

⁹⁸ USDOL, BLS, http://www.bls.gov/cpi/cpi_dr.htm#2010, accessed September 17, 2013. Note: annual average for 2012 is an unweighted average of monthly indices.

Table 12 Annual average retail prices of pork, beef, and broiler meat, 2008–13 (cents per pound)

Year	Pork	Beef	Broilers
2008	294	433	175
2009	292	426	178
2010	311	439	175
2011	343	481	177
2012	347	499	189
2013	364	529	196

Source: Averages of monthly data from USDA, ERS, Historical monthly price spread data for pork, beef, and broilers, August 19, 2014.

increase in the composite retail price of beef over the same period, and substantially more than the increase in the composite price of (chicken) broilers.

Import Penetration Levels

Very little pork consumed in the United States is imported, and imports as a share of domestic consumption has not significantly changed over the past five years. U.S. pork imports were equivalent to 4.3 percent of domestic consumption in 2008. Imports as a share of overall consumption dipped to 4.2 percent in 2009, rose slightly in 2010 and 2011, and declined slightly again in 2012 and were equivalent to 4.5 percent of domestic consumption in 2013.⁹⁹ Canada is, by far, the largest U.S. import source, followed by Denmark.

The Effect of Exports on Value

Most pork produced in the United States is consumed in the U.S. domestic market. However, exports as a share of total production have increased from 20 percent in 2008 to 23 percent in 2011 and 2012, before declining slightly to 22 percent in 2013. The United States is the world's largest exporter of pork, and exports add significantly to the value of pork produced.

Researchers at the University of Missouri-Columbia estimated that a 1 percent increase in net exports as a share of pork production translates into a 3.3 percent increase in hog prices.¹⁰⁰ Research conducted for the National Pork Board found that \$1 million in U.S. pork exports adds 5 cents per hundred-weight to U.S. live hog prices for the month.¹⁰¹

Exports also help to make U.S. pork production more profitable, not only by increasing overall demand, but because consumers in major export markets largely prefer cuts that are less valued in the U.S. market. For instance, U.S. consumers favor leaner cuts, while Chinese consumers favor cuts with more external fat.¹⁰² A producer can maximize returns by selling each specific cut in the market in which it is most highly valued, adjusted for transportation and other costs.

⁹⁹ USDA, Production, Supply and Distribution database, accessed September 17, 2012.

¹⁰⁰ Plain, Ron, "Economic Impact of U.S. Pork Trade, 1986-2012," University of Missouri-Columbia Department of Agricultural and Applied Economics Working Paper No. AEWP 2013-2.

¹⁰¹ Hayes, Dermot, "How Pork Producers Benefit from Exports," 2012, 4. The impact of pork variety meat exports is even higher, an estimated 20 cents per hundred-weight per million dollars in exports per month.

¹⁰² Ortega and Wang, *Opportunities for U.S. Pork in China and Implications for U.S. Hog Producers*, Purdue University Extension, EC-758-W, April 2009, 1.

The total supply of pork in the U.S. market changed little during 2008–13. Increased exports largely balanced decreased domestic consumption. Over this period, U.S. pork production first declined through 2010, and then increased to nearly the level observed in 2008. Exports increased 9 percent over the period, or by 182,000 mt. Domestic consumption declined about 2 percent, or by 197,000 mt.¹⁰³

U.S. Trade

Overview

The United States is the world's largest exporter of pork, with increasing net exports driven by increased efficiency, the shift towards larger operations and more vertical integration, and a decline in domestic consumption.¹⁰⁴ Because EU pork imports are even lower than U.S. pork imports, the EU is the largest net exporter of pork (table 13). Over 2008–13, U.S. pork exports have increased, both in quantity and as a share of domestic production. During this time, U.S. pork exports increased by 1 percent in volume and 17 percent in value. U.S. exports of pork amounted to 22 percent of domestic production in 2013. Conversely, the United States is a relatively minor importer of pork, accounting for only about 5.3 percent the volume of global pork imports in 2012.¹⁰⁵ Over 2008–13, U.S. pork imports increased by 52 percent in volume and 18 percent in value, but remained small relative to domestic production and consumption. U.S. imports of pork accounted for about 4.3 percent of domestic consumption in 2008, and 4.5 percent of consumption in 2013.¹⁰⁶ U.S. exports and imports of pork are shown in figure 6:

Table 13 2013 exports, imports, and net trade of pork, selected countries, thousand metric tons, carcass weight equivalent

	Imports	Exports	Net trade
EU	18	2200	2182
United States	389	2292	1903
Canada	235	1245	1010
Brazil	1	600	599

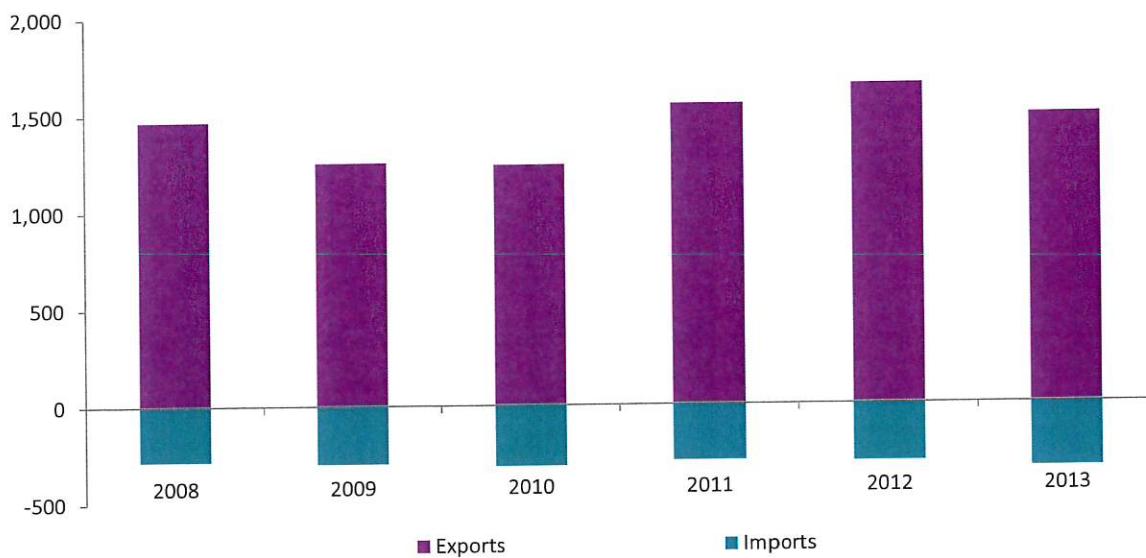
Source: USDA, Production, Supply, and Distribution database (accessed February 27, 2014).

¹⁰³ USDA Production, Supply and Distribution database, accessed February 27, 2014.

¹⁰⁴ USDA, ERS, "Hogs and Pork: Trade," <http://www.ers.usda.gov/topics/animal-products/hogs-pork/trade.aspx>, accessed September 23, 2013.

¹⁰⁵ USDA, FAS, *Livestock and Poultry: World Markets and Trade*, April 2013, 15.

¹⁰⁶ USDA, Production, Supply, and Distribution database, accessed September 12, 2013.

Figure 6 Annual U.S. pork exports and imports, 2008–13 (thousand metric tons, product weight)

Source: USITC DataWeb/USDOC, (accessed February 28, 2014).

The United States is not a major exporter of swine, accounting for only 1–2 percent of global swine exports in most years. Most U.S. exports are of purebred swine for breeding (HS 0103.10). In 2012, U.S. exports to China of purebred swine more than doubled, and exports to Mexico more than tripled over the 2011 volume. As a result, U.S. exports of purebred swine in 2012 were nearly double the 2011 level, and overall exports of swine grew by more than one-half. China's imports of breeding swine from all sources increased substantially in 2012 and 2013, as China's swine industry continued to transition away from smaller farms to specialized and commercial operations. Approximately one-half of China's breeding animals are of genetic lines that originated in the United States.¹⁰⁷ In most years, Mexico is the largest export destination for U.S. swine. However, in June 2013, Mexico restricted imports of live swine from the United States, in response to outbreaks of porcine epidemic diarrhea (PED).¹⁰⁸ In contrast, the United States is one of the world's leading importers of live swine. In 2013, U.S. imports of swine accounted for 36 percent the value of global trade in live swine, with almost all originating from Canada.

Both tariffs and nontariff measures have served to restrict U.S. pork exports over the past six years. U.S. pork exports are subject to a “gate price” system in Japan, which penalizes lower-priced cuts, and a tariff rate quota (TRQ) in Russia. For part of the period, Mexico imposed a 5-percent tariff on imports of U.S. pork as the result of a cross-border trucking dispute.¹⁰⁹ U.S. pork exports are also subject to a wide range of sanitary measures. These measures include restrictions related to H1N1 influenza, requirements for trichinae treatments, and maximum residue limits for veterinary drugs and bacteria counts. One measure that has significantly

¹⁰⁷ Rabobank, “Industrialization of China’s Pork Supply Chain,” September 2012, 4-5.

¹⁰⁸ National Pork Producers Council Capital Update, “Mexico Announces Restrictions on U.S. live Pig Imports,” June 28, 2013.

¹⁰⁹ National Pork Producers Council press release, “Tariff on U.S. Pork Lifted by Mexico,” October 21, 2011.

restricted U.S. pork exports is a ban by some countries on pork raised with the feed additive ractopamine. These measures are discussed in greater detail below.

U.S. Exports

Swine

The United States exports limited numbers of both purebred swine for breeding and other non-purebred swine. In most years, Mexico is the largest U.S. export market by volume for purebred swine for breeding. However, in most years, the value of such exports to China exceeds the value of exports to Mexico.¹¹⁰ U.S. exports of non-purebred swine are a small share of total exports and are predominately to Canada and Mexico. Exports of such swine weighing 50 kilograms (kg) or more are typically for immediate slaughter, while swine weighing less than 50 kg are typically of “feeder pigs.” The value of U.S. live swine exports to all markets in both 2012 and 2013 was over \$30 million (table 14), but was less than 1 percent the value of pork exports.

Table 14 U.S. exports of swine by country 2008–13

Destination	2008	2009	2010	2011	2012	2013
Number						
China	7,221	4,249	2,501	7,325	12,533	13,653
Mexico	75,409	2,583	3,918	8,748	26,793	7,574
Korea	1,014	312	955	4,923	543	1,422
Brazil	350	202	830	1,861	738	1,221
Russia	0	0	0	1,128	3,094	2,526
All other	13,459	13,899	16,003	10,745	11,358	7,608
Total	97,453	21,245	24,207	34,730	55,059	34,004
Thousand dollars						
China	12,053	4,214	1,229	8,488	17,118	19,794
Mexico	9,027	959	2,019	2,883	6,410	2,826
Korea	1,192	640	829	4,217	807	1,578
Brazil	245	104	635	1,160	810	1,301
Russia	0	0	0	1,704	2,628	1,270
All other	5,335	3,646	3,604	5,660	5,555	3,737
Total	27,852	9,563	8,316	24,112	33,328	30,506

Source: USITC DataWeb/USDOC, accessed February 28, 2014.

Pork Export Overview

Japan is consistently the largest export destination market for U.S. pork, generally followed by the United States’ North American Free Trade Agreement (NAFTA) partners, Mexico and Canada. China is the world’s largest producer and consumer of pork, and even a small change in its production relative to its consumption can have a significant impact on global trade. An outbreak of porcine reproductive and respiratory syndrome (PRRS) virus, or “blue ear disease,” in 2006 and 2007 led to a decline in China’s pork production, and an increased demand for

¹¹⁰ As noted, in June 2013, Mexico restricted imports of live swine from the United States. National Pork Producers Council Capital Update, “Mexico Announces Restrictions on U.S. live Pig Imports,” June 28, 2013.

imports that was largely filled by U.S. pork. As a result, total U.S. pork exports increased substantially in 2008.

In 2009, U.S. pork exports declined from the 2008 level, but were higher than in years prior to 2008. One reason for the decline was that Chinese import demand lessened as its domestic supplies rebounded. Pork exports in 2009 were also impacted by the global economic downturn and by the enactment of bans on U.S. pork in numerous countries related to concerns over H1N1 influenza, commonly known as “swine flu.” Most influenza-related bans on U.S. pork were lifted in 2010, and with purchasing power rising in major export markets, U.S. pork exports have increased in both volume and value, despite a decline in 2013 (table 15). U.S. pork exports to the Republic of Korea (Korea) more than doubled in 2011, after an outbreak of foot and mouth disease (FMD) in that country led to the destruction of up to one-third of Korea’s swine herd.¹¹¹ U.S. pork exports to Mexico increased substantially in 2012 in response to both purchasing-power gains and pork’s price advantage over beef.¹¹² In 2012, U.S. pork exports to all markets were 12 percent greater in volume and 28 percent higher in value than in 2008,¹¹³ before declining slightly in 2013 as U.S. domestic consumption increased.¹¹⁴

Table 15 U.S. exports of fresh and frozen pork by country, 2008–13

Destination	2008	2009	2010	2011	2012	2013
Metric tons						
Japan	419.1	391.8	391.0	464.6	421.6	402.3
Mexico	228.4	274.2	283.1	285.8	409.8	427.7
Canada	125.1	112.8	112.6	122.6	130.8	111.9
China/Hong Kong	263.2	112.3	106.5	256.0	237.8	199.5
Korea	94.9	83.9	69.5	148.6	132.5	87.2
Australia	30.7	38.5	44.5	56.0	59.6	48.6
Russia	134.0	89.7	53.7	63.4	89.4	5.4
All other	171.7	150.4	178.7	150.5	164.5	205.7
Total	1,467.1	1,253.7	1,239.7	1,547.5	1,646.1	1,488.4
Thousand metric tons						
Japan	1,470.7	1,464.1	1,551.9	1,884.0	1,873.5	1,810.2
Mexico	411.8	423.8	559.1	598.5	777.7	853.6
Canada	410.4	357.6	419.5	468.3	492.5	432.3
China/Hong Kong	480.3	194.0	174.8	550.9	482.3	430.2
Korea	229.3	182.8	160.9	433.3	371.9	234.1
Australia	79.4	85.7	122.6	178.9	181.4	149.1
Russia	315.4	179.9	154.9	198.3	255.8	16.1
All other	390.7	291.0	385.2	372.8	404.7	503.3
Total	3,788.0	3,178.9	3,528.9	4,685.0	4,839.8	4,428.8

Source: USITC DataWeb/USDOC, accessed February 28, 2014.

¹¹¹ Production and demand in Korea are discussed below under Export Market Profiles.

¹¹² USDA, FAS, Mexico: Livestock and Products Annual, GAIN Report No. MX2065, September 9, 2012, 1, 8.

¹¹³ Reported quantity data are on a product weight basis and differ from data on a carcass weight basis.

Tariffs

U.S. pork exports enjoy preferential tariff treatment in many major export markets, under free trade agreements. Exports to Canada and Mexico benefit from zero duties under NAFTA. Most U.S. pork exports to Korea now enter duty free under a bilateral free trade agreement (FTA), as of January 1, 2014. Exports to Australia are also duty-free under its FTA with the United States. Exports to Russia are subject to a TRQ. In contrast, exports to China and Japan do not benefit from any preferential tariff treatment.

The government of Japan supports domestic producers of pork through a differential duty system that keeps domestic prices above international levels.¹¹⁴ Japan's "gate price" system for pork imports is based on the import price relative to a domestically determined reference price. Imports with a cost-plus-insurance-and-freight (CIF) price less than the gate price are subject to a duty equal to the difference between the two prices. For imports with a CIF value greater than the gate price, the tariff is 4.3 percent ad valorem. In 2012, the gate price was 393 yen/kg (about \$2.24 per pound) for carcasses and half-carcasses, and 524 yen/kg (\$2.98 per pound) for fresh, chilled, or frozen pork cuts. In practice, traders mix different cuts in their import lots in order to ensure that CIF prices are near or above the gate price. The gate price system thus serves to limit exports of lower priced cuts to the Japanese market.¹¹⁵ In addition, imports are subject to a consumption (value-added) tax (VAT) of 5 percent ad valorem.

Mexico's tariff rates for all fresh, chilled, or frozen pork imports are 20 percent ad valorem. However, swine and pork imports from the United States enter the Mexican market duty free under NAFTA. Additionally, all imports into Mexico are charged a VAT: 11 percent ad valorem on products destined for the northern border region, and 16 percent ad valorem on imports into the rest of the country.¹¹⁶

On August 19, 2009, Mexico imposed a 5 percent ad valorem tariff on imports of pork from the United States as part of a long-running dispute that had kept Mexican motor carriers from engaging in cross-border trucking.¹¹⁷ An agreement to end the dispute was announced July 6, 2011, and consequently the retaliatory tariff was halved.¹¹⁸ The remaining tariff was eliminated in October 2011, when the first permit to a Mexican trucking firm was granted.¹¹⁹

Although Canada is a NAFTA partner, U.S. swine and pork exporters do not enjoy a tariff advantage over non-NAFTA countries in the Canadian market. Rather, Canada maintains zero tariffs on imports of all swine, and on all fresh, chilled, and frozen pork.

¹¹⁴ USDA, FAS, Japan: Livestock and Products Annual, GAIN Report No. JA2023, October 2, 2012, 10.

¹¹⁵ National Pork Producers Council, "Negotiating Objectives," comments to the Office of the United States Trade Representative on Japan's Participation in the Proposed Trans-Pacific Partnership Trade Agreement, June 7, 2013.

¹¹⁶ Export.gov, "Country-specific Tariff and Tax Information,"

http://export.gov/logistics/eg_main_018142.asp#P126_12020, accessed November 7, 2013.

¹¹⁷ National Pork Producers Council (NPPC), "Background on the Mexican Trucking Issue and Pork," nd. cited in NPPC, "Mexico Adds Pork to Trade Retaliation List," August 16, 2010.

¹¹⁸ USDA Press Release No. 029.11, "Statement from Agriculture Secretary Tom Vilsack on the U.S.-Mexico Agreement to Resolve the Cross-Border Trucking Dispute," July 6, 2011.

¹¹⁹ National Pork Producers Council press release, "Tariff on U.S. Pork Lifted by Mexico," October 21, 2011.

Imports of purebred swine for breeding enter China duty free. The most-favored nation (MFN) tariff on all other swine is 10 percent ad valorem.¹²⁰ China's MFN import tariff on all types of fresh or chilled pork is 20 percent ad valorem, and its tariff on frozen pork is 12 percent ad valorem. In addition, swine and pork imports are subject to a VAT of 13 percent ad valorem. Hong Kong maintains zero duty on all imports of swine and pork.

Korea maintains MFN tariffs of 18 percent ad valorem on swine, 22.5 percent ad valorem on fresh and chilled pork, and 25 percent ad valorem on frozen pork. The U.S.-Korea Free Trade Agreement (KORUS), which entered into force on March 15, 2012,¹²¹ provided for the phase-out of duties on imports of U.S. pork. Imports of U.S. fresh pork cuts, other than bone-in hams and shoulders and pork belly, plus frozen cuts, began to enter the Korean market duty-free as of January 2014. The remaining duties on all other U.S. pork shipments will be phased out over 10 years and will be duty-free as of January 1, 2021.¹²²

U.S. pork exports to Australia benefit from zero duty under the existing bilateral FTA. The U.S.-Australia FTA entered into force on January 1, 2005.¹²³

In April 2003, the Russian Federation established a TRQ for imports of pork. Within-quota imports were assessed a duty of 15 percent of the customs value, but not less than 0.25 euro per kg. Above-quota imports were subject to a duty of 60 percent ad valorem, but no less than 0.60 euro per kg. In June 2005, U.S. producers were allocated 11.5 percent of the within-quota volume of pork. The total within-quota volume of pork peaked in 2009 and has since declined. The U.S. country-specific quota volume remained 11.5 percent of the total within-quota volume of pork plus trimmings through 2011. In 2012, the total within-quota volume was decreased and country-specific quotas, including that for the United States, were eliminated. Data on Russia's TRQs for pork imports 2008–12 are presented in table 16.

¹²⁰ China's imports of U.S. swine and pork are subject to MFN tariffs.

¹²¹ The agreement was approved by the U.S. Congress on October 12, 2011, and ratified by the Korean National Assembly on November 22, 2011. United States Trade Representative, "U.S.-Korea Free Trade Agreement." <http://www.ustr.gov/uskoreaFTA>, accessed October 30, 2013.

¹²² U.S. Agricultural Trade Office, Korea Product Brief: Pork, <http://www.atoseoul.com/fta/Pork.pdf>, accessed November 12, 2013.

¹²³ USTR, Free Trade Agreements: Australia, <http://www.ustr.gov/trade-agreements/free-trade-agreements/australian-fpa>.

Table 16 Russia's within-quota tariff-rate quota (TRQ) volumes for pork, 2008–13 (thousand mt)

Commodity	2008	2009	2010	2011	2012	2013
Pork: Fresh/chilled, frozen:						
European Union	249.3	253.4	225.0	225.0	^a	^a
United States	49.8	100.0	57.5	57.5	^a	^a
Paraguay	1.0	1.0	^a	^a	^a	^a
All other	193.4	177.5	189.6	189.6	^a	^a
Subtotal	493.5	531.9	472.1	472.1	^b 400.0	^b 400.0
Pork trimmings from all sources	^a	^a	^c 27.9	^c 27.9	^c 30.0	^c 30.0
Total	493.5	531.9	500.0	500.0	430.0	430.0

Source: USDA, FAS, Russian Federation Livestock and Products Semi-annual, GAIN Report No. RS1053, September 21, 2010, Table 14; USDA, FAS, Russian Federation: GOR Distributes Meat and Poultry TRQs for 2012, GAIN Report No. RS1202, January 11, 2012, 6. USDA, FAS, Russian Federation: 2013 Meat and Poultry TRQs, GAIN Report RS1275, November 27, 2012, 4.

^a Not available.

^b The 2012 and 2013 TRQ volumes did not include country-specific allocations.

^c Pork trimmings may be imported either under the TRQ for trimmings or under the TRQ for pork.

Sanitary Regulations

Influenza

In March 2009, an influenza strain (H1N1), popularly called “swine flu,” was discovered in Mexico. In October 2009, the disease was found to exist in a commercial swine herd in the United States.¹²⁴ The disease swiftly spread to other producers in the United States and Canada, and then globally. In April 2009, Russia and China suspended imports of pork from several U.S. states as well as from several other countries, reportedly over concerns that pork imports could transmit swine flu.¹²⁵ Both countries subsequently expanded their bans. Eventually, 27 countries enacted bans on pork from at least some U.S. states.¹²⁶ Other countries that imposed bans included Bahrain, Croatia, Ecuador, El Salvador, Guatemala, Honduras, Indonesia, Jordan, Kazakhstan, Korea, Serbia, Thailand, and Ukraine.¹²⁷ Most restrictions were lifted in 2010.

In addition to restrictions on imports, food safety concerns reportedly reduced consumer demand for pork in some U.S. export markets. Many consumers in Mexico reportedly either cut back their pork consumption or stopped eating pork altogether out of concerns related to H1N1 influenza.¹²⁸ A survey of Chinese consumers in August 2009 found that approximately two-thirds of those surveyed had stopped eating pork at some point because of concerns related to influenza, and that more than 20 percent incorrectly believed that swine flu could be spread by consuming pork.¹²⁹

¹²⁴ Meatingplace.com, “H1N1 Found in Indiana Commercial Pigs,” November 3, 2009.

¹²⁵ Meatingplace.com, “China Bans Pork from 17 More U.S. States on Apparent Flu Fears,” May 5, 2009; “Swine Flu Prompts Russia to Suspend Meat Imports from Mexico, Several U.S. States,” April 27, 2009.

¹²⁶ Meatingplace Magazine, (Gabbett, Rita) “The Issues: Swine Industry Flu,” August 2009.

¹²⁷ USTR, 2010 Report on Sanitary and Phytosanitary Measures, 19.

¹²⁸ Meatingplace.com, “Pork Prices Inchng Back up as Flu Fears Abate,” May 8, 2009.

¹²⁹ Meatingplace.com, “H1N1 Still Causing Fear in Chinese Pork Consumers: Study,” September 4, 2009.

Ractopamine

As noted previously, several foreign governments ban imports of pork from swine produced using ractopamine, a veterinary drug that promotes lean meat growth in swine.¹³⁰ Although maximum residue limits (MRLs) have been established by the Codex Committee, imports of pork from swine produced using ractopamine are not allowed in the EU and China, the world's two largest pork-consuming markets. The ban on pork produced using ractopamine is a significant barrier to U.S. exports, particularly to China. Chinese consumers have a relatively greater preference for cuts considered less desirable in the United States and Europe, such as offal and cuts from the shoulder as compared to loin cuts. If not for the Chinese ban on pork produced using ractopamine, U.S. producers that primarily serve the U.S. domestic market could profitably export some of these cuts to China. In February 2013, Russia also prohibited imports of pork from swine produced with ractopamine.¹³¹ Taiwan and Thailand ban imports of such pork as well.¹³² In response, some U.S. producers have moved away from ractopamine use. Smithfield Foods, the largest U.S. pork producer, has eliminated ractopamine from over one-half its pork.¹³³

Other Sanitary Issues

In June 2009, Russia banned pork imports from two U.S. plants over biological concerns (bacteria counts) and announced that it was monitoring shipments from several other U.S. producers because of concerns over "forbidden and harmful substances" in products from these producers.¹³⁴ Russia maintains zero tolerances for several pathogens, as well as zero tolerances or very low MRLs that exceed international standards for some commonly used veterinary drugs.¹³⁵ Some U.S. slaughter facilities have been declared ineligible to export pork to the Russian Federation because of detection of pathogens or veterinary drug residues. Most of these facilities were individual establishments operated by firms with multiple locations, and most regained eligibility to export to Russia at a later date.

U.S. pork producers seeking to export to the EU market must participate in the "Pork for the EU" program. Because of the restrictions of this program, including a ban on the use of beta-agonists, traceability and identification requirements, and incision and inspection of a sample of hog hearts by an FSIS inspector, few U.S. producers are eligible to export to the EU. U.S. pork

¹³⁰ See U.S. Production and Consumption: Production Costs for more information on ractopamine use.

¹³¹ National Hog Farmer, "Russia Bans U.S. Beef and Pork Over Ractopamine," February 4, 2013.

<http://nationalhogfarmer.com/business/russia-bans-us-beef-and-pork-over-ractopamine>; Farm Futures, "Russia Finalizes Meat Ban on Ractopamine Concerns," February 12, 2013, <http://farmfutures.com/story-russia-finalizes-meat-ban-ractopamine-concerns-0-94607>.

¹³² Taiwan also prohibits the use of ractopamine in swine but does not prohibit its use in cattle. However, Taiwan also tests for the presence of ractopamine in pork and has a zero-tolerance policy.

¹³³ MeatPoultry.com, "Smithfield Moves to Phase out Ractopamine Use," May 15, 2013, http://www.meatpoultry.com/articles/news_home/Business/2013/05/Smithfield_moves_to_phase_out.aspx?ID=%7BD40B5159-2FE4-42E8-AD79-3DD946B72967%7D. Smithfield later announced that it was being purchased by Shuanghui International, a major Chinese meat producer; Reuters, "Analysis: Behind China's U.S. Pork Deal, Fears over Feed Additives," <http://www.reuters.com/article/2013/05/30/us-usa-smithfield-ractopamine-analysis-idUSBRE94T03520130530>.

¹³⁴ Meatingplace.com, "Russia Bans Imports from two Tyson Plants, Watching Cargill," June 4, 2009.

¹³⁵ USTR, *2013 Report on Sanitary and Phytosanitary Measures*, March 2013, 72.

destined for the EU must additionally be tested by a laboratory in Canada before export, an added cost that further restricts exports.¹³⁶

Australia has implemented regulations requiring that all solid waste associated with pork imports be treated to control the risks of introducing the PRRS virus or Post-weaning Multisystemic Wasting Syndrome (PMWS) into the Australian swine herd. Treatment methods must be approved by Australia's Quarantine Inspection Service (AQIS). Requirements for disposal of the waste associated with pork imports and on interstate transportation of imported pork introduced by AQIS in 2008 are reportedly burdensome and appear to conflict with a risk assessment carried out in 2004.¹³⁷

U.S. pork exports to Chile benefit from zero duties under the existing bilateral FTA, which entered into force January 1, 2004. Chile's imports of U.S. pork have increased eightfold since 2006. However, Chile requires that imports of U.S. pork be frozen or tested for trichinae, a measure that significantly limits U.S. pork exports to Chile.¹³⁸

Export Market Profiles

Japan

Japan was the world's largest pork importer throughout 2008–13, in terms of both volume and value.¹³⁹ Globally, Japan is the ninth-largest producer of pork, and the sixth-largest consumer. Japan's total annual pork imports declined in 2009, increased through 2012, but did not regain their 2008 volume, and then declined in 2013. In 2012, imports were 10 percent below 2008 levels on a quantity basis, and 4 percent lower in value. The United States is the leading import supplier, followed by Canada, Denmark, and Mexico (table 17).

After initially declining in 2009, Japan's pork consumption increased through 2012, rising to 3 percent above 2008 levels. However, Japan's domestic production grew 4 percent over the period, and Japan's global pork imports declined slightly in volume, falling about 2 percent on a carcass-weight basis (table 18).¹⁴⁰

¹³⁶ USTR, 2010 Report on Sanitary and Phytosanitary Measures, 45.

¹³⁷ National Pork Producers Council, written submission to the USITC, March 23, 2010, 3-4.

¹³⁸ USTR, 2010 Report on Sanitary and Phytosanitary Measures, 32.

¹³⁹ USDA, FAS, Production, Supply, and Distribution database, accessed October 28, 2013; GTIS Global Trade Atlas, accessed November 5, 2013.

¹⁴⁰ Trade on a carcass weight basis is not directly comparable with product weight data.

Table 17 Japan: Pork imports 2008–13

Source	2008	2009	2010	2011	2012	2013
Metric tons						
United States	336,993	288,667	298,347	323,750	313,860	281,144
Canada	174,686	172,373	178,648	174,004	172,614	142,241
Denmark	159,784	122,923	133,586	130,723	116,742	113,951
Mexico	56,551	43,684	40,855	41,275	45,630	59,379
All other	89,677	75,292	101,592	123,343	129,959	141,736
Total	817,691	702,938	753,027	793,096	778,804	738,451
Million dollars						
United States	1,719.1	1,606.3	1,774.0	2,125.2	2,060.1	1,519.2
Canada	893.9	967.5	1,065.7	1,148.1	1,135.8	767.6
Denmark	809.3	685.9	798.7	860.9	767.8	613.0
Mexico	295.5	246.3	246.0	274.1	301.6	324.3
All other	465.1	428.9	616.5	817.6	862.6	773.9
Total	4,183.0	3,934.9	4,500.9	5,225.8	5,127.8	3,998.0

Source: GTIS Global Trade Atlas database (accessed August 28, 2014).

Note: Trade data are in product weight and are not directly comparable to carcass weight equivalent.

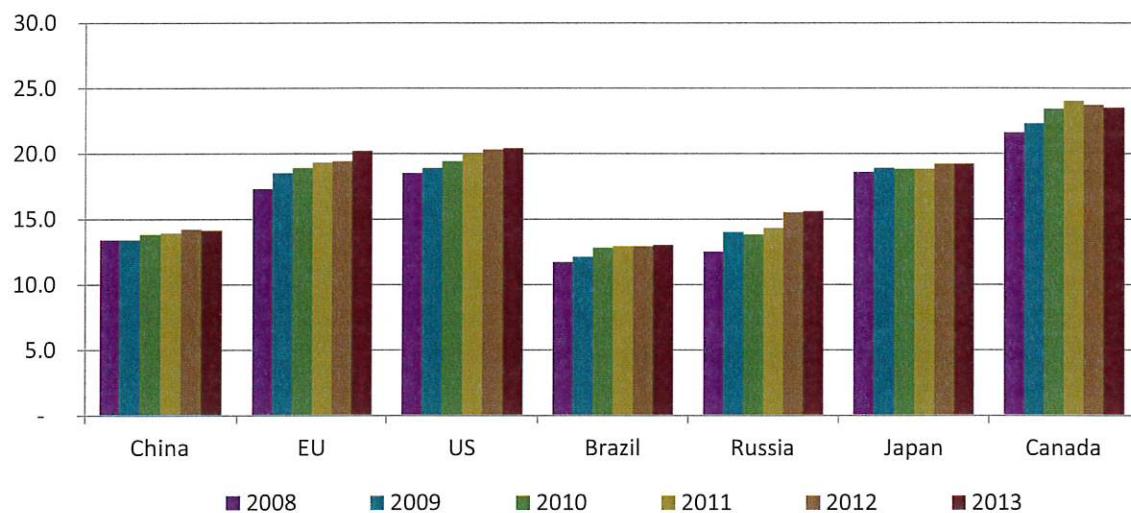
Table 18 Japan: Pork production, consumption, and trade, 2008–13 (thousand metric tons, carcass-weight equivalent)

Measure	2008	2009	2010	2011	2012	2013
Production	1,249	1,310	1,292	1,267	1,297	1,305
Consumption	2,486	2,467	2,488	2,522	2,557	2,553
Exports	1	1	1	1	1	2
Imports	1,267	1,138	1,198	1,254	1,259	1,240
Net imports	1,266	1,137	1,197	1,253	1,258	1,238

Source: USDA, FAS, Production, Supply, and Distribution database (accessed February 27, 2014).

Japanese swine producers recorded approximately 19 piglets per sow per year, and this increased slightly throughout the five-year period. This was higher than production per sow in Brazil, China, and Russia, and approximately equal to average production per sow in the United States and the EU in 2009. However, while the annual number of piglets produced per sow increased in the EU and the United States over the period, the increase was smaller in Japan (figure 7).

Japan was the largest export market for U.S. pork throughout 2008–12 by volume, and second-largest in 2013, behind Mexico. Additionally, the annual average unit value (AUU) of U.S. pork exports to Japan was consistently higher than the AUU for U.S. pork exports to any other major market, making Japan an even more important market in terms of value. About 70 percent of Japan's pork imports from the United States are of fresh/chilled product. The rest is frozen. Over the last five years, U.S. exports of pork carcasses and bone-in hams and shoulders to Japan declined, in favor of other products. In 2013, Japan's imports of U.S. pork included no carcasses or half-carcasses, and bone-in hams and shoulders accounted for less than 1 percent by volume, down from 9 percent in 2008. U.S. export statistics indicate that the volume of exports to Japan declined by about 4 percent, but Japan's import statistics indicate that imports from the United States declined by about 12 percent by volume.

Figure 7 Average pigs produced annually per sow, selected countries, 2008–13

Source: USDA, FAS, Production, Supply, and Distribution database (accessed February 27, 2014) and calculations by Commission staff.

Mexico

Mexico was the second-largest export market for U.S. pork in all but one of the last five years, and U.S. pork exports to Mexico increased in every year during 2008–13. The United States is by far the largest supplier of pork imports to Mexico, accounting for 90 percent of Mexican imports by value in 2013.¹⁴¹ MFN tariffs for swine imports into Mexico are 9 to 20 percent ad valorem, but U.S. swine and pork enter Mexico duty-free under NAFTA.

Most imports, including most imports from the United States, are of bone-in ham and shoulder cuts or mechanically deboned meat for further processing.¹⁴² In 2013, bone-in ham and shoulder cuts accounted for 71 percent of Mexico's pork imports from the United States by value, and 74 percent by volume. Most of these exports were of fresh/chilled product.¹⁴³ In 2012, Mexico increased its imports of purebred swine for breeding by 20,000 over the previous year to 28,624. In 2013, such imports declined to 7,418.¹⁴⁴

Mexico is also the world's seventh-largest pork exporter. Exports accounted for 6–8 percent of production 2008–12.¹⁴⁵ Mexico's largest export market for pork is Japan, followed by the United States and Korea. Mexico's pork exports in 2009 were impacted by the effects of the outbreak of H1N1 influenza discussed earlier and the effects of the global economic slowdown.¹⁴⁶

¹⁴¹ GTIS Global Trade Atlas, accessed November 8, 2013.

¹⁴² USDA, FAS, *Mexico: Livestock and Products Semi-Annual*, GAIN Report No. MX4015, March 3, 2014, 10.

¹⁴³ GTIS Global Trade Atlas, accessed August 28, 2014.

¹⁴⁴ Ibid.

¹⁴⁵ USDA, FAS, Production, Supply, and Distribution database, accessed February 27, 2014.

¹⁴⁶ GTIS Global Trade Atlas, accessed August 28, 2014; USDA, FAS, *Mexico: Livestock and Products Semiannual*, GAIN Report No. MX0012, March 12, 2010, 4.

Improved genetics in the Mexican swine herd has led to slight increases in both the number of pigs produced per sow and carcass weights over 2008–12.¹⁴⁷ The number of pigs produced annually per sow increased from 15.0 to 15.6, and pork production per animal slaughtered (carcass weight) increased from 76 to 81 kg.¹⁴⁸ Continued improvements in genetics are anticipated to provide larger pig crops, increased slaughter weights, and faster weight gain in the near future.¹⁴⁹

Canada

Canada was the third-largest export market for U.S. pork by value in 2013, and the fourth-largest market by volume. Canadian and U.S. swine and pork production is highly integrated, with trade between the two being largely driven by proximity.

Canada is a major pork exporter. Over 2008–13, Canada produced over twice as much pork as it consumed in every year. The United States is Canada's largest export market for pork, and Canada's pork exports to the United States in 2013 were nearly twice the volume of U.S. exports to Canada. Canadian imports of pork accounted for about 10 percent of its domestic supply throughout 2008–11, increasing slightly to 11 percent in 2012 and 2013.¹⁵⁰

China/Hong Kong

China is both the world's largest producer and consumer of pork, accounting for nearly one-half of global production and consumption. Even a small change in China's production relative to its consumption of pork has a substantial impact on world markets. Rising personal incomes have increased China's demand for pork over time. In 2006 and 2007, a disease first identified as blue-ear disease and later identified as PRRS significantly decreased China's swine and pork production. China lost approximately 5 percent of its breeding herd to the PRRS virus in 2006, and produced about 7 percent fewer piglets in 2007 than in 2006.¹⁵¹ Average pork prices in China increased rapidly through 2007. Severe weather in early 2008 and an earthquake in Sichuan province in May 2008 further disrupted China's production.¹⁵²

The decline in China's domestic production and sharp increase in prices led the government to expand purchases of frozen pork for its strategic meat reserves and to cut import tariffs on frozen pork from 12 percent to 6 percent ad valorem from June 1 to December 1, 2008. As a result, annual U.S. exports of pork to China increased significantly in both value and quantity. China increased its imports of pork from the United States in 2007 and 2008, both directly and indirectly (largely through Hong Kong). In 2008, the United States was the second-largest foreign supplier of pork to China behind Hong Kong. China and Hong Kong combined were the second-largest export market for U.S. pork in 2008, and registered the largest annual increase.

China's swine production costs are higher than U.S. producer costs and rising. A February 2012 USDA publication found that the higher cost of feed in China drove average costs for both

¹⁴⁷ USDA, FAS, *Mexico: Livestock and Products Annual*, GAIN Report No. MX2065, September 9, 2012, 8; USDA, Production, Supply, and Distribution database, accessed February 27, 2014.

¹⁴⁸ USDA, Production, Supply, and Distribution database, accessed October 28, 2013.

¹⁴⁹ USDA, FAS, *Mexico: Livestock and Products Annual*, GAIN Report No. MX3062, August 15, 2013, 9.

¹⁵⁰ USDA, FAS, Production, Supply, and Distribution database, accessed August 28, 2014.

¹⁵¹ USDA, FAS, *China: Livestock and Products Semi-Annual Report*, GAIN Report No. CH8014, March 1, 2008, 13.

¹⁵² USDA, FAS, *China: Earthquake's Impact on China's Swine Production*, GAIN Report No. CH8035, May 21, 2008.

“backyard” and commercial hog producers higher than those of U.S. producers.¹⁵³ Swine prices in China have continued to climb relative to the United States. Between January 2010 and December 2012, swine prices rose about 150 percent in China, compared to 25 percent in Iowa.¹⁵⁴

Korea

Korea was the fifth-largest export market for U.S. pork in 2013, in both value and volume. Koreans consume about twice as much pork as beef, and imports account for about one-fourth to one-third of the total supply of pork in Korea each year. In 2011, Korea was the fourth-largest U.S. export market by volume, ahead of Canada. U.S. pork exports to Korea are overwhelmingly frozen rather than fresh/chilled, and about one-half is unprocessed pork other than bone-in hams or shoulders.¹⁵⁵ U.S. producers also typically export several hundred breeding animals to Korea annually.

A series of outbreaks of FMD, beginning in late November 2010, increased Korea’s demand for imported swine and pork. The widespread FMD outbreaks led to culling of more than 150,000 cattle and over 3 million swine in an effort to stop the spread of the disease.¹⁵⁶ In response, U.S. pork exports to Korea more than doubled in 2011 over the previous year. U.S. exports of live swine to Korea increased to nearly 5,000 in 2011, from less than 1,000 in 2010, as Korean producers rebuilt swine herds and pork production. On March 24, 2011, Korea lowered its FMD alert status and on March 25 declared that the outbreak was over.¹⁵⁷ Subsequently, U.S. pork exports to Korea declined in 2012 from the previous year, but remained higher than any year before 2011. Exports in 2013 declined further, as Korea’s domestic production increased.

U.S. swine and pork exports to Korea benefited from Korea’s establishment of duty-free TRQs on swine and pork imports in order to help rebuild sow inventories and restrain rising pork prices.¹⁵⁸ In 2011 Korea established an initial zero-duty TRQ for pork imports of 60,000 metric tons, but in June 2011 the TRQ was expanded to 260,000 metric tons of pork to be imported by December 31, 2011.¹⁵⁹ A separate TRQ totaling 70,000 metric tons was established for pork imports in the first three months of 2012.¹⁶⁰

By June 2012, Korea’s swine herd reached pre-FMD levels.¹⁶¹ However, in response to the FMD outbreak, new restrictions were placed on the livestock industry in Korea, including licensing

¹⁵³ Gale, Marti, and Hu, USDA, ERS, *China’s Volatile Pork Industry*, February 2012. 9-10.

¹⁵⁴ Pig333.com, “Pig Prices in the World and their Evolution,” http://www.pig333.com/markets_and_prices/, (requires registration), accessed September 26, 2013.

¹⁵⁵ HTS 0203.19.40 and 0203.29.40.

¹⁵⁶ USDA, FAS, *Korea: Livestock and Products Semi-annual*, GAIN Report No. KS1110, March 2, 2011, 2.

¹⁵⁷ There has not been a reported outbreak since February 26, 2011. Yonhap News Agency, “S. Korea Lowers Foot-and-mouth Alert Level,” March 24, 2011; Joongang Daily, “With FMD Over, New Precautions Unveiled by Gov’t,” March 25, 2011.

¹⁵⁸ USDA, FAS, *Korea: Livestock and Products Semi-annual*, GAIN Report No. KS1218, March 6, 2012, 11. USDA, FAS, *Korea: Korea’s Adjustment and In-quota Tariffs for 2012*, GAIN Report No. KS1205, January 31, 2012, 4.

¹⁵⁹ USDA, FAS, *Korea: Korea Announces Measures to Increase Chilled Pork Belly Imports*, GAIN Report No. KS1131, August 2, 2011, 2.

¹⁶⁰ USDA, FAS, *Korea, Korea’s Adjustment and In-quota Tariffs for 2012*, GAIN Report No. KS 1205, January 31, 2012, 1.

¹⁶¹ USDA, FAS, *Korea: Livestock and Products Annual*, GAIN Report Number KS1243, September 10, 2012, 14.

requirements for swine producers. New licensing requirements include space requirements, siting requirements (e.g. no swine producer can be within 30 meters of a river), and mandatory training for new entrants into the industry. In addition, part of the expense of a mandatory FMD vaccination will be passed on to swine producers.¹⁶²

Russia

Russia is the world's second-largest pork importer, behind Japan. In Russia, increased demand, fueled by higher personal incomes had outpaced the rise in domestic production through 2008. U.S. pork exports to Russia increased 70 percent in volume terms between 2007 and 2008 (94 percent in value). The global recession and a significant decline in export prices for Russia's crude petroleum and natural gas led to a decline in consumer demand for meat in Russia in 2009, followed by a steady increase. Compared to 2008, however, imports from all sources in 2013 were 25 percent lower in volume and 7 percent lower in value, as domestic production rose. Over the five-year period, imports from Brazil and the United States declined due to sanitary concerns, and imports from Denmark and Germany increased (table 19).

Table 19 Russia: Pork imports 2008–13

Source	2008	2009	2010	2011	2012	2013
Metric tons						
Brazil	238,696	249,688	223,926	133,050	122,313	124,151
Denmark	68,949	65,314	72,646	80,317	60,603	88,435
Germany	68,528	83,743	112,029	110,293	86,958	81,603
United States	159,377	107,671	59,404	58,016	87,907	5,828
All other	255,405	129,254	172,621	274,914	362,460	292,107
Total	790,955	635,670	640,626	656,590	720,241	592,124
Million dollars						
Brazil	697.0	769.4	712.7	429.9	393.0	421.2
Denmark	178.8	195.1	222.9	260.0	213.5	316.1
Germany	189.3	232.7	316.2	353.1	302.7	287.4
United States	435.9	299.0	177.7	186.7	292.7	18.7
All other	699.5	364.5	493.5	879.0	1,204.7	1,004.0
Total	2,200.5	1,860.7	1,923.0	2,108.7	2,406.6	2,047.4

Source: GTIS Global Trade Atlas database, accessed August 28, 2014.

Note: Trade data are in product weight and are not directly comparable to carcass weight equivalent.

Over 2008–13, Russia's pork consumption increased about 9 percent. However, Russia's domestic pork production increased 26 percent 2008–13, leading to an overall decline in imports (table 20).

¹⁶² USDA, FAS, *Korea: Detailed Measures for Improvement of Livestock Disease Control*, GAIN Report No. KS1128, June 7, 2011, 2-5.

Table 20 Russia: Pork production, consumption, and trade, 2008–13 (thousand metric tons, carcass-weight equivalent)

Measure	2008	2009	2010	2011	2012	2013
Production	1,736	1,844	1,920	2,000	2,075	2190
Consumption	2,843	2,719	2,835	2,971	3,145	3090
Exports	0	1	1	0	0	0
Imports	1,107	876	916	971	1,070	900
Net imports	1,107	875	915	971	1,070	900

Source: USDA, FAS, Production, Supply, and Distribution database, accessed August 28, 2014.

The Russian Federation joined the World Trade Organization (WTO) in August 2012. Going forward, within-quota pork imports are subject to zero tariffs, and over-quota imports continue to face a tariff of 65 percent ad valorem.¹⁶³ The tariff on swine imports dropped from 40 percent to 5 percent ad valorem after accession. The effects of Russia's tariff reductions will depend in large measure on its SPS restrictions. Since Russia's WTO accession, it has banned imports of U.S. pork because of ractopamine use, banned imports of pork from Belarus, banned imports of chilled pork from several EU member states, and restricted imports of live swine from the EU.¹⁶⁴

Russia was the sixth-largest export market for U.S. pork in 2012, but dropped to 19th in 2013. The United States was Russia's fourth-largest supplier of imported pork in 2012, behind the EU, Canada, and Brazil, but dropped to 15th in 2013.¹⁶⁵ Imports account for about one-third of Russia's pork supply. However, the import share declined slightly over 2008–13 despite increased pork consumption.¹⁶⁶

In November 2006, Russia and the United States signed a bilateral WTO Market Access Agreement that stipulated that Russia was to apply international standards and science-based SPS measures on imports of U.S. pork. Side letters to the agreement confirmed that the USDA Food Safety and Inspection Service (FSIS) was to certify U.S. slaughter, processing, and cold storage facilities to export pork to the Russian Federation, and specified that Russia was to accept the method of inactivation of trichinae in imports of pork from the United States by freezing.¹⁶⁷

¹⁶³ USTR, "U.S. Export Opportunities from Russia's Membership in the WTO: U.S. Agriculture Sector," http://www.ustr.gov/webfm_send/3211, accessed January 6, 2014.

¹⁶⁴ USDA, FAS, *Russian Federation: Livestock and Products Annual*, GAIN Report No. RS1357, September 3, 2013, 11.

¹⁶⁵ USDA, FAS, Production, Supply and Distribution database, accessed October 28, 2013; GTIS, Global Trade Atlas database, accessed February 27, 2014.

¹⁶⁶ Imports accounted for 39 percent of consumption in 2008 and 32 to 34 percent 2009–12. USDA, FAS, Production, Supply and Distribution database, accessed October 28, 2013.

¹⁶⁷ Trichinosis is caused by *Trichinella spiralis*, a parasitic roundworm that can be found in omnivores, including swine. Infection is rare in modern commercial swine producers, and trichinae can be killed by freezing to very low temperatures. USDA, APHIS, "Trichinae" factsheet, http://www.aphis.usda.gov/vs/trichinae/docs/fact_sheet.htm.

U.S. Imports

Swine

U.S. imports of swine, which come primarily from Canada, are falling due to a decline in Canadian swine inventory and production, the relative strength of the Canadian dollar, and mandatory country-of-origin labeling (COOL) requirements (described below) for pork sold in the United States. In 2013, imports of swine weighing less than 50 kg from Canada, other than purebred animals for breeding, accounted for 84 percent of all U.S. swine imports from all worldwide sources. Swine production in the United States and Canada is highly integrated. Most imports from Canada are feeder pigs weighing less than 50 kg (HTS 0103.91) and market hogs for immediate slaughter (HTS 0103.92.00.10). There are also small imports of breeding stock (table 21).

Table 21 U.S. Swine imports, by source country, 2008–13 (number of animals)

Description and sources	2008	2009	2010	2011	2012	2013
Purebred breeding						
Canada	4,999	2,030	1,228	933	1,411	1,976
United Kingdom	0	0	0	6	9	0
Other, less than 50 kilograms						
Canada	7,036,483	5,221,439	4,699,916	4,800,747	4,790,212	4,158,920
Austria	0	0	34	0	0	0
Other, over 50 kilograms						
Canada	2,306,442	1,141,084	1,046,683	992,915	860,623	796,466
Italy	0	0	0	0	21	0
Ireland	0	0	1,273	0	0	0
Total number	9,347,924	6,364,553	5,749,134	5,794,601	5,652,276	4,957,362

Source: GTIS, Global Trade Atlas database, accessed August 28, 2014.

Imports of live swine from Canada increased through 2007, but in 2008 these declined slightly in volume and nearly 20 percent in value from the previous year. Imports continued to decline in 2009 and 2010, in both quantity and value because of developments discussed in further detail below. In 2011 and 2012, swine imports remained at approximately the level observed in 2010, but then declined in 2013.

Several factors in Canada and the United States have contributed to the integration of the swine industry. NAFTA facilitates cross-border investments. The abolition of Canadian grain transport subsidies in the 1990s encouraged swine production in the grain-growing regions of Canada and led to lower U.S. countervailing duties on swine imports from Canada.¹⁶⁸ Higher feed costs led many Canadian swine producers to shift to breeding and farrowing operations only, and many of these producers export swine to the United States. In the United States, swine producers in the Corn Belt have benefited from access to feed supplies and have

¹⁶⁸ USDA, ERS *Hogs and Pork: Trade*, May 28, 2012, <http://www.ers.usda.gov/topics/animal-products/hogs-pork/trade.aspx#trade>.

increasingly specialized in finishing operations. In 2013, over 97 percent of feeder pigs imported from Canada were destined for the 10 Corn Belt states.¹⁶⁹

Most imports of swine from Canada are of animals weighing less than 50 kg, which are fed to slaughter weight for the production of pork in the United States. In order to improve efficiency, an increasing number of U.S. pork producers have shifted from farrow-to-finish operations to facilities that specialize in only part of the production cycle. Some U.S. swine producers, particularly in the Corn Belt states, import feeder pigs from Canada. The volume of U.S. imports of swine weighing less than 50 kg peaked in 2008 and then declined. The value of these imports fell in 2008 from 2007, as prices for feeder pigs from Canada declined. The value of swine imports grew in 2010 compared to 2009, as the AUV of feeder pig imports from Canada rose by 44 percent. The value and AUV of feeder pig imports has since declined.

The ratio of feeder pig imports to U.S. swine production was just over 6 percent in 2008, fell to less than 5 percent in 2009, and has continued to fall 2010–13, as shown in table 22:

Table 22 U.S. imports of feeder pigs and ratio to U.S. swine production, 2008–13

Description	2008	2009	2010	2011	2012	2013
Canadian feeder pig imports (million)	7.0	5.2	4.7	4.8	4.8	4.2
Canadian feeder pigs, ratio to U.S. production (percent)	6.1	4.6	4.2	4.1	4.1	3.5

Source: Canadian imports from GTIS Global Trade database; U.S. swine production numbers from USDA Production, Supply, and Distribution database, accessed February 27, 2014.

In addition to feeder pigs, U.S. processors also import some hogs for immediate slaughter from Canada. Pork production (slaughter and processing of swine) exhibits economies of scale. Larger production facilities encourage cross-border trade, as packing plants near the border bid for Canadian swine in order to maximize capacity utilization.¹⁷⁰ Imports of swine weighing 50 kg or more (HS 0103.92) are primarily hogs for immediate slaughter (market hogs), but also may include swine for breeding other than purebred animals, and “other”. Imports of swine weighing 50 kg or more, other than purebred breeding animals, also declined by approximately two-thirds during 2008–13.¹⁷¹

Pork

Pork imports account for a small share of U.S. consumption. The primary sources of imported pork are Canada, Mexico, and the major pork-producing countries of the EU. Pork imports rose slightly in 2009, and more rapidly in 2010; declined slightly in volume in 2011; and have since risen again. Canada was by far the greatest source of pork imports throughout the period. In 2013, imports from Canada accounted for 85 percent of U.S. pork imports by quantity and 79 percent by value.

The volume of U.S. pork imports, predominately from Canada and the EU, increased slightly between 2008 and 2012 and increased 12 percent in 2013 (table 23). The United States imports a wide variety of products from Canada and Mexico and imports are often driven by

¹⁶⁹ USDA, AMS, USDA Market News, *Canadian Live Animal Imports into the U.S. by Destination*, WA_LS637, January 22, 2014.

¹⁷⁰ Haley, *Market Integration in the North American Hog Industries*, November 2004, 13.

¹⁷¹ Swine other than purebred breeding animals, 50 kg and over, HTS 010392.

transportation costs and proximity of production to population centers. Most imports from the EU are of frozen pork, imported under HS 0203.29. Some imports from the EU are of pork products that are a specialty of a particular region. A large share of U.S. pork imports from the EU, and from Denmark in particular, are of ribs for the popular “baby back ribs.”¹⁷² The value of pork imports has increased more rapidly than volume, with increases in AUV from all major import sources.

Table 23 U.S. pork imports by source, 2008–13

Source	2008	2009	2010	2011	2012	2013
Metric tons						
Canada	235,626	253,271	267,401	243,532	247,714	284,986
Denmark	35,075	32,658	31,516	30,037	29,894	24,624
Netherlands	1,951	2,050	2,706	2,949	3,399	4,787
Mexico	1,973	2,557	3,758	4,670	5,746	5,551
Poland	249	924	1,813	1,515	1,648	3,651
Ireland	1,866	1,642	2,211	2,659	4,143	3,727
United Kingdom	1,507	1,654	1,839	2,048	2,434	3,078
All other	4,608	2,473	2,417	2,122	3,430	3,572
Total	282,855	297,229	313,661	289,531	298,409	333,977
Thousand dollars						
Canada	552,253	525,465	716,731	773,797	767,103	894,810
Denmark	144,126	133,969	131,320	136,589	139,627	122,885
Netherlands	8,954	8,975	11,963	14,400	16,613	24,244
Mexico	7,333	7,590	12,426	17,659	21,725	21,582
Poland	1,264	4,525	7,951	6,050	7,295	18,960
Ireland	8,367	7,324	9,826	12,463	18,795	17,226
United Kingdom	7,844	9,497	9,869	10,451	13,572	16,807
All other	16,543	9,483	9,267	8,105	13,290	17,312
Total	746,684	706,829	909,353	979,515	998,019	1,133,827

Source: USITC DataWeb/USDOC (accessed February 28, 2014).

Pork imports from Canada are both fresh and frozen, although most are of fresh/chilled products.¹⁷³ Imports from Canada generally encompass the same range of pork products as those produced by the U.S. domestic industry.¹⁷⁴ The United States is Canada’s largest market for pork exports, on both a volume and value basis.¹⁷⁵

As with Canada, U.S. pork imports from Mexico are of a wide variety of cuts,¹⁷⁶ but are predominantly of frozen pork. During 2008–12, pork imports from Mexico were concentrated under HTS 0203.29.40 (meat of swine frozen, not elsewhere specified or identified, other than

¹⁷² Geisler and Collins, *Agricultural Marketing Resource Center*, “Pork International Markets Profile,” March 2010, 1; industry representative, telephone conversation with Commission staff, August 9, 2010; USDA, ERS *Hogs and Pork: Trade*, May 28, 2012, <http://www.ers.usda.gov/topics/animal-products/hogs-pork/trade.aspx#trade>.

¹⁷³ USDA, ERS, “Factors Shaping Expanding U.S. Red Meat Trade,” February 2009, 6; official import statistics from the U.S. Department of Commerce.

¹⁷⁴ Industry representative, telephone conversation with Commission staff, August 9, 2010.

¹⁷⁵ Canada Pork International, *Canadian Pork Exports - Industry Information*, <http://www.canadapork.com/en/industry-information/canadian-pork-exports>, June 21, 2011.

¹⁷⁶ USDA, ERS, “Factors Shaping Expanding U.S. Red Meat Trade,” February 2009, 6.

processed). Imports under this tariff line accounted for between 95 percent and 98 percent of U.S. pork imports from Mexico during 2008–11, before declining to 84 percent of imports in 2012 as imports of fresh pork from Mexico increased.

Tariffs

All swine enter the U.S. market free of duty.¹⁷⁷ U.S. processed pork imports from countries with normal trade relations are subject to a rate of 1.4¢ per kilogram (roughly 0.4 percent ad valorem equivalent in 2013).¹⁷⁸ Fresh or frozen pork, other than processed, enters the United States duty free. Pork from NAFTA partners enters the United States duty-free, as do imports of pork from a number of other countries that have entered into bilateral FTAs with the United States or that otherwise have preferential access to the U.S. market.¹⁷⁹ In 2013, 85 percent of U.S. pork imports by volume were either from Canada or Mexico, or entered duty free under the U.S.–Chile FTA. Most of the remaining 15 percent were products that are duty-free.

Mandatory Country-of-Origin Labeling

The 2002 and 2008 Farm Bills amended the Agricultural Marketing Act of 1946 to require retailers to notify their customers of the country of origin of certain meat, fish, and other agricultural products, including muscle cuts of pork. The notification requirement was implemented initially by an interim rule (effective on September 30, 2008), followed by a final rule to clarify the requirements for pork and other products that may be the product of more than one country. The final rule was published in the Federal Register on January 15, 2009. Food service establishments were exempted along with covered commodities that are ingredients in a processed food item.

Per the 2009 regulations, imported pork that undergoes no production steps in the United States was required to be labeled with the country of origin consistent with that declared to U.S. Customs and Border Protection. Pork was to be labeled as “Product of the United States” only if it was produced from swine that was born, raised, and slaughtered in the United States (table 24). If the swine were imported from another country—for example Canada—into the United States for immediate slaughter, the pork was to be labeled as “Product of Canada and the United States.” Because swine may be raised in more than one country, COOL regulations permitted pork from imported swine that were born, raised, or slaughtered in the United States and that were not imported for immediate slaughter (termed “Category B” animals) to be labeled with all countries in which production steps occurred. For instance, if the pork was produced from swine that were born in Canada, but fed and slaughtered in the United States, it was to be labeled as “Product of the United States and Canada.” In addition, producers were allowed to label pork from a group of swine with a label that covers all swine in the group, in a process known as “comingling.” Thus, pork produced from a group of swine in which some

¹⁷⁷ With the exception of imports from Cuba and North Korea. Imports of swine from either of these countries would be subject to a duty of 4.4 cents per kilogram.

¹⁷⁸ In this context, “processed” refers to product that is ground, minced, cut into sizes for stew meat or similar uses or special shapes, or rolled and skewered.

¹⁷⁹ Pork from the following countries enters the United States duty-free: Australia; Bahrain; Canada; Chile; Israel; Jordan; Korea; Mexico; Morocco; Oman; Peru; the DR-CAFTA countries; Singapore; and countries covered by the Generalized System of Preferences, the African Growth and Opportunity Act, the Caribbean Basin Economic Recovery Act, and the Andean Trade Promotion and Drug Eradication Act.

production steps for some swine took place in Canada and some in Mexico could be labeled “Product of the United States, Canada, and Mexico” as long as none of the swine were imported for immediate slaughter, even if some swine in the group were born, raised, and slaughtered in the United States. Pork produced from swine, some of which were born in Canada and the rest in the United States, could all be labeled “Product of the United States and Canada” as long as none of the swine were imported for immediate slaughter.

Table 24 Examples of 2009 country-of-origin labeling (COOL) requirements for pork, based on locations of swine production steps

Born	Raised	Slaughter	Label
Canada	Canada	Canada	Product of Canada
Canada	Canada	United States	Product of Canada and the United States
Canada	United States	United States	Product of the United States and Canada
United States	United States	United States	Product of the United States

Source: USDA, AMS, “Country of Origin Labeling (COOL): Frequently Asked Questions,” January 12, 2009.

Canada and Mexico alleged that the mandatory COOL requirements are inconsistent with U.S. obligations under the WTO Agreements, including the GATT 1994 and the Agreement on Rules of Origin, Agreement on Sanitary and Phytosanitary Measures, and the Agreement on Technical Barriers to Trade (TBT). Both countries requested consultations with the United States under the WTO Dispute Settlement Understanding, and when the consultations failed to resolve the dispute, each of the two countries requested the establishment of a panel to review the matter. The WTO Dispute Settlement Body established a single panel to examine the matters raised by both disputes. In November 2011, the panel found, among other things, that the U.S. COOL measure violates the TBT Agreement. Canada, Mexico, and the United States each appealed to the Appellate Body certain issues of law and legal interpretations covered by the panel report, and in June 2012 the Appellate Body affirmed the panel in part and reversed it in part. The Appellate Body upheld the panel’s finding that the U.S. COOL measure violates Article 2.1 of the TBT Agreement by according less favorable treatment to imported Canadian cattle and hogs and Mexican cattle than to like domestic cattle and hogs. The United States was given until May 23, 2013, to bring its COOL regulations into compliance with its WTO obligations.

The USDA’s Agricultural Marketing Service (AMS) published a proposed rule on March 12, 2013, and a final rule, effective May 23, in order to “improve the overall operation of the program and also bring the current mandatory COOL requirements into compliance with U.S. international trade obligations.” The revised rule was designed to address the regulations and rulings of the Dispute Settlement Body. The final rule requires that pork sold at retail in the U.S. market be labeled with information that specifies where the animal was born, raised, and slaughtered (or harvested) (table 25). The final rule also eliminated the provisions for comingling pork from a group of swine. A coalition of meat industry organizations has filed suit to block the regulations.

Table 25 Examples of 2013 country-of-origin labeling (COOL) requirements for pork, based on locations of swine production steps

Born	Raised	Slaughter	Label
Canada	Canada	Canada	Born, raised, and slaughtered in Canada
Canada	Canada	United States	Born and raised in Canada, slaughtered in the United States
Canada	United States	United States	Born in Canada, raised and slaughtered in the United States
United States	United States	United States	Born, raised, and slaughtered in the United States

Source: USDA, AMS, Mandatory Country of Origin Labeling, Final Rule, Federal Register vol. 78, No. 101, May 24, 2013.

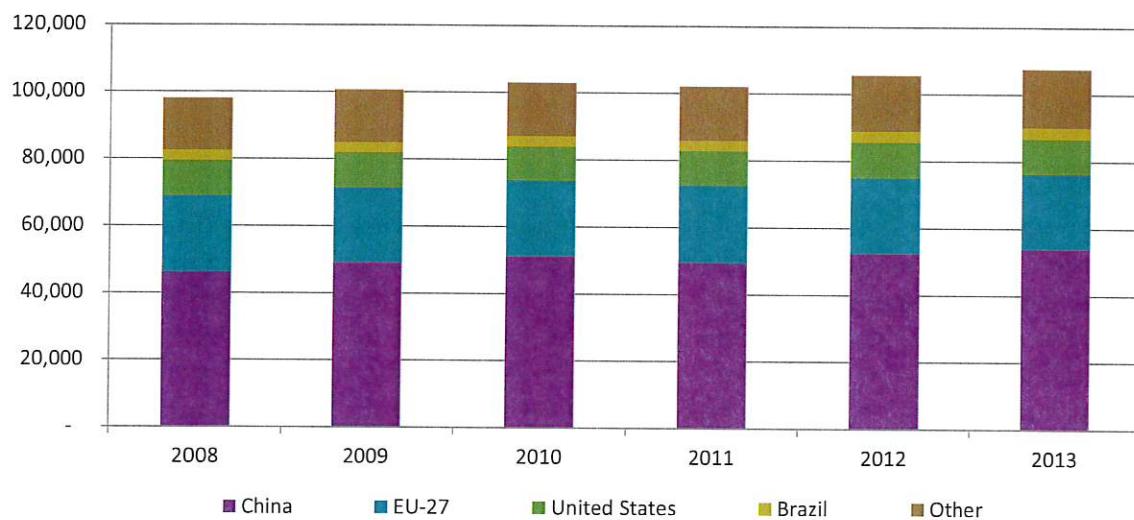
Canada and Mexico did not agree that the U.S. changes brought the United States into full compliance, and instead viewed the changes as more restrictive and causing further harm. In August 2013, Canada and Mexico requested the establishment of a compliance panel, and the panel was established and composed in September 2013. The final report of the compliance panel was still pending as of mid-October 2014.

Foreign Industry Profiles

Overview

Global pork production increased about 8 percent over 2008–12. Although pork is widely consumed worldwide, only a few economies account for the majority of global pork production. The top four producers—China, the EU, the United States, and Brazil—accounted for 84 percent of global production in 2013 (figure 8). China consistently accounts for nearly one-half of global pork production, increasing from 48.7 percent in 2008 to 50.0 percent in 2013. The four largest producing economies consistently accounted for just under 85 percent of annual global pork production over this period.

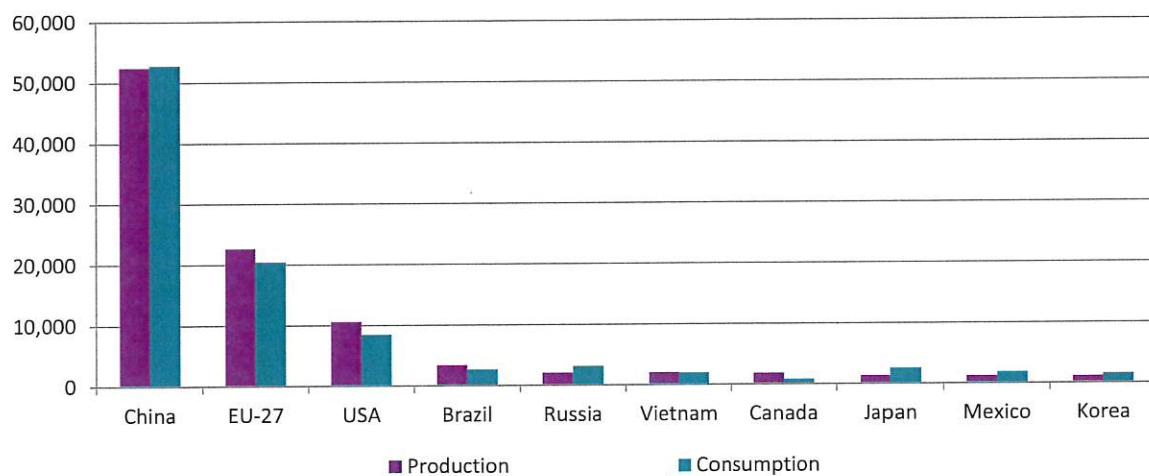
Figure 8 Global pork production, 2008–13 (thousand metric tons, carcass-weight equivalent)



Source, USDA, FAS, Production, Supply, and Distribution database (accessed October 28, 2013).

In the majority of the top pork-producing economies, most domestic production is consumed internally. Canada is the notable exception, as the world's seventh-largest pork producer and the world's third-largest pork exporter. Most of Canada's pork production is destined for export markets, particularly the United States, as noted previously (figure 9).

Figure 9 Pork production and consumption, selected economies, 2013 (thousand metric tons, carcass-weight equivalent)



Source: USDA, FAS, Production, Supply, and Distribution database (accessed October 28, 2013).

Increases in swine and pork production have been accomplished with increases in the number of pigs produced per breeding sow per year in most major producing countries. These increases are the result of both improvements in genetics and changes in production practices. As shown in figure 6, producers in Canada, the United States, and the EU consistently produce more pigs per sow than producers in other major producing economies. The largest increases between 2008 and 2012 were in the EU, Canada, Russia, and the United States. Canada produces more pigs per breeding sow than any other major producer.

Major Producers

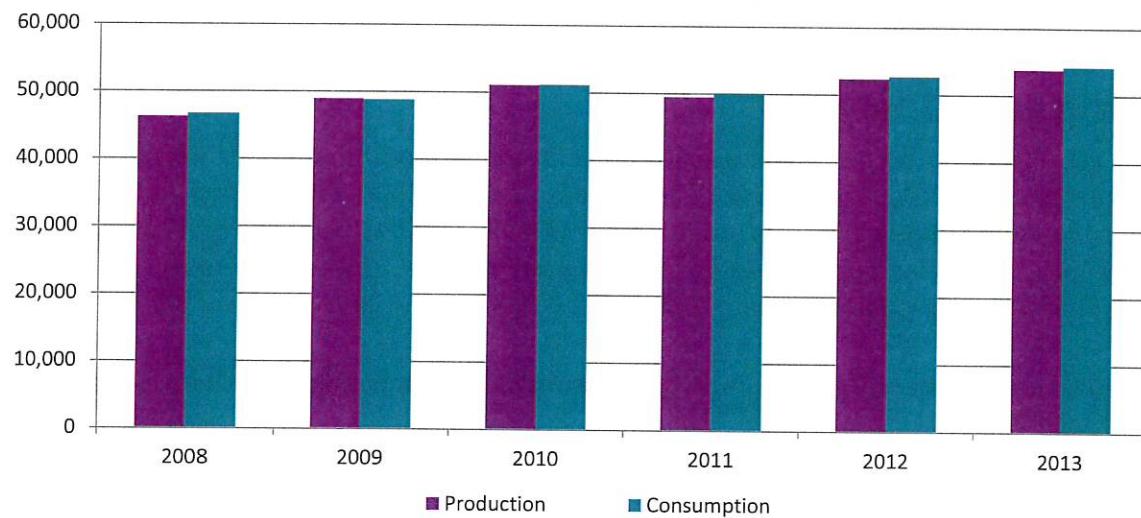
China

China is both the world's largest producer and its largest consumer of pork, accounting for nearly one-half of global production and consumption. China's annual production of pork increased about 16 percent over 2008–13, slightly faster than the overall growth in its swine herd (8 percent over the period). China generally produces pork for domestic consumption, and it is the world's third-largest pork-importing country behind Japan and Russia. However, it is also the world's fourth-largest pork exporter behind the United States, the EU, and Brazil. In 2013, China accounted for about 11 percent of global pork imports and 4 percent of global exports.¹⁸⁰

¹⁸⁰ USDA, FAS, Production, Supply, and Distribution database (accessed October 28, 2013).

Pork is the most widely consumed meat in China, accounting for about 65 percent of animal protein consumption. Chinese consumers generally prefer cuts considered less desirable in the West, such as offal and shoulder cuts, as compared to loin cuts, which are typically preferred in the United States and Europe. Many Chinese consumers also prefer cuts with a higher fat content.¹⁸¹ China is largely self-sufficient in pork production (figure 10), but it increasingly imports inputs for swine feed. Over 2008–13, U.S. soybean exports to China jumped more than 50 percent.¹⁸² U.S. exports of corn to China have been more volatile, but have more than doubled over the same five year period.¹⁸³

Figure 10 China's annual pork production and consumption, 2008–13 (thousand metric tons, carcass-weight equivalent)



Source: USDA, FAS, Production Supply and Distribution database.

As noted previously, China's production of pork in 2007 and 2008 was driven down by an increase in PRRS and a harsh winter in some parts of the country. As a result, China's pork imports increased. China's imports of purebred swine for breeding from the United States also increased substantially in 2008. Swine imports declined in 2009, and fell in 2010 to a level below that observed in 2006. Swine imports increased in 2011 and 2012 because of demand for improved genetics in China's swine herd and government subsidies for swine producers based on the number of sows.¹⁸⁴

In China, there are three main types of swine producers: backyard producers; “specialized households” producing from 30 to several hundred hogs per year; and commercial operations producing 500 or more hogs per year. In 2003, it was estimated that backyard producers produced 80 percent, specialized households 15 percent, and commercial operations 5 percent

¹⁸¹ Ortega, Wang, and Wu, “Food Safety and Demand: Consumer Preferences for Imported Pork in Urban China,” 2009, 53.

¹⁸² Imported soybeans are crushed to produce soybean oil for human consumption and soybean meal for animal feed. Soybeans yield approximately 20 percent oil and 80 percent meal.

¹⁸³ U.S. Commerce Department official statistics, USITC Dataweb.

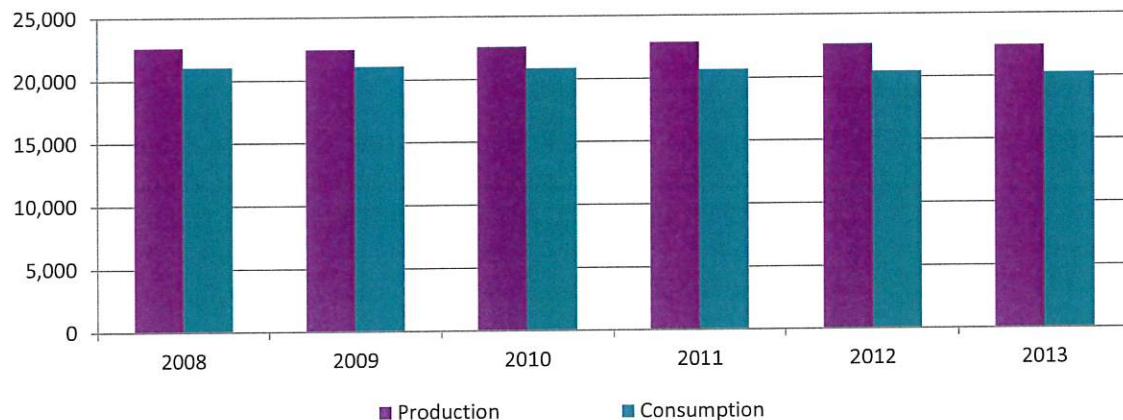
¹⁸⁴ USDA, FAS, *China: Livestock and Products Annual*, GAIN Report No. CH11042, September 2, 2011, 2, 8; USDA, FAS, *China: Livestock and Products Annual*, GAIN Report No. CH12056, September 23, 2012, 7.

of the swine produced in China.¹⁸⁵ Since then, commercial operations have increased rapidly and the share of production accounted for by backyard producers has declined as China's improving labor market has lured labor away from small operations. By 2010, the share of hogs produced by farms with less than 50 hogs was estimated at only 50 percent.¹⁸⁶ In the past, Chinese pork producers were competitive with imports on a delivered-cost basis owing to their low labor costs, coupled with government support for the pork sector. However, as China's pork production has shifted to larger operations that use labor more efficiently, the advantage of low labor costs has declined. Commercial swine producers in China also purchase commercial feeds rather than relying on crop residues, food scraps, and forage for feed as is a common practice of backyard producers, thereby increasing the share of feed costs in total production costs. As a result, China's average swine production costs more than doubled between 2002 and 2009.¹⁸⁷

European Union

In the EU,¹⁸⁸ pork production volume in 2012 was little changed from 2008 (figure 11).¹⁸⁹ Between 2008 and 2012, the number of breeding sows in the EU as a whole declined by 12 percent, but the number of pigs produced per sow increased 15 percent over the same period, more than offsetting the decline in the number of sows. However, there were substantial shifts in production volume within the EU among the individual member states.

Figure 11 EU annual pork production and consumption, 2008–13 (thousand metric tons, carcass-weight equivalent)



Source: USDA, FAS, Production, Supply, and Distribution database, accessed October 31, 2013.

¹⁸⁵ Somwaru, Xiaohui, and Tuan, *China's Hog Production Structure and Efficiency*, 2003, 6.

¹⁸⁶ Gale, Marti, and Hu, *China's Volatile Pork Industry*, USDA Economic Research Service, LDP-M-211-01, February 2012, 8.

¹⁸⁷ Ibid., 7–8.

¹⁸⁸ The 27 EU member states prior to 2013 (when Croatia joined to form the EU-28) are Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

¹⁸⁹ USDA, FAS, Production, Supply, and Distribution database, accessed October 28, 2013.

Swine production in the EU is heavily concentrated, particularly in the 15 countries that were already member states in 1995.¹⁹⁰ In the EU as a whole, approximately 75 percent of swine are produced by the largest 1.5 percent of operations. The smallest 85 percent of swine farms in the EU account for just over 5 percent of the swine produced. Of the EU countries that are major suppliers to the U.S. market, Denmark, Ireland, the Netherlands, and the United Kingdom produce over 90 percent of swine on farms with more than 400 market hogs, and only Poland produces the majority of its swine on farms with less than 400 market hogs.¹⁹¹ In comparison, in the United States, the largest 5 percent of swine producers held 62 percent of the swine inventory in 2012.¹⁹²

Average carcass prices for market hogs rose at a slower rate in the EU than in the United States during 2008–11.¹⁹³ Further, because the dollar appreciated relative to the euro over the period, average carcass prices in the EU declined slightly in dollar terms, eroding much of the price advantage for U.S. producers. The EU average cost of swine production was 56 percent higher than the U.S. average cost in 2008, but by 2012, this advantage had shrunk to 29 percent.¹⁹⁴

Brazil

Brazil is the world's fourth-largest producer of swine pork, behind China, the EU, and the United States. It is also the fourth-largest pork exporter behind the United States, the EU, and Canada. In 2012, exports accounted for about the same share of pork production in Brazil as in the United States—20 percent in 2012 (figure 12).

Although much of Brazil is recognized by the World Animal Health Organization (OIE) as FMD-free with vaccination, and the southern state of Santa Catarina (the largest pork-producing and -exporting state in Brazil) is recognized as FMD-free without vaccination, sanitary restrictions related to FMD prevent most producers in Brazil from exporting fresh/chilled or frozen raw pork to the United States. This is also true for Japan, Mexico, Canada, and the Republic of Korea, which are some of the largest export markets for U.S. producers.¹⁹⁵ Brazil's major export markets for pork are Russia, Hong Kong, Ukraine, Argentina, and Angola. In mid-2011, Russia imposed bans on imports of pork, as well as of beef and poultry from three Brazilian states, which significantly depressed Brazil's exports.¹⁹⁶

¹⁹⁰ The 15 EU member states in 1995 were Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

¹⁹¹ The EU Farm Structure Survey collects data on the swine inventory in three size categories; breeding sows, piglets, and "other pigs" (here referred to as "market hogs"). The 1.5 percent of swine producers with more than 400 other pigs accounted for 75.7 percent of other pigs in 2007. Eurostat, *Pig Farming in the EU, a Changing Sector*, August 2010, 2.

¹⁹² USDA, NASS, *Farms, Land in Farms, and Livestock Operations, Annual Summary, 2012*, February 2013, 19.

¹⁹³ European Commission, "EU Market Prices for Representative Products from 2007."

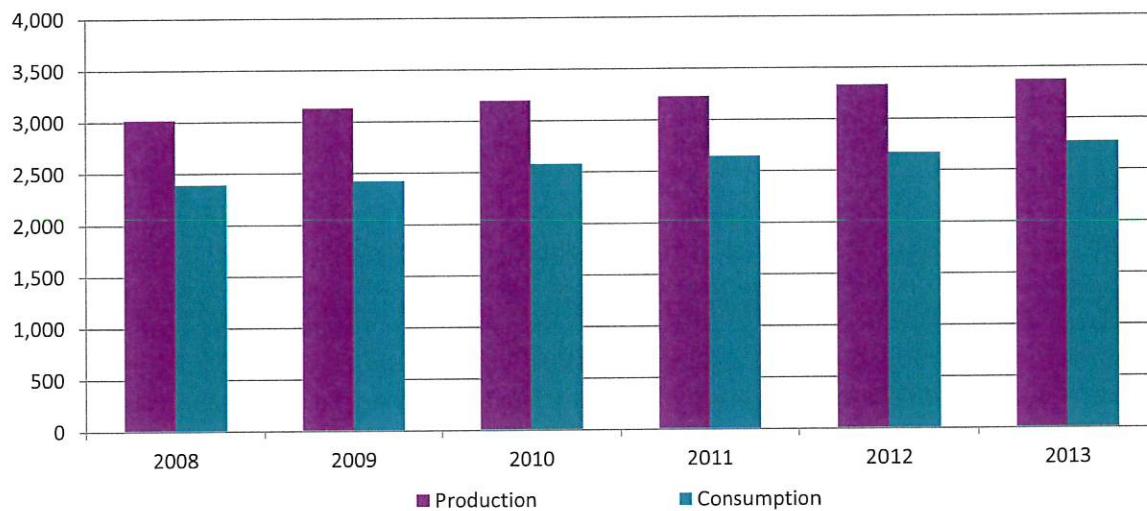
http://ec.europa.eu/agriculture/markets-and-prices/price-monitoring/market-prices-from-2007-monthly_en.pdf, November 10, 2013.

¹⁹⁴ BPEX, "2012 Pig Cost of Production in Selected Countries," October 2013, 8.

¹⁹⁵ World Animal Health Organization (OIE), "Foot and Mouth Disease Portal," <http://www.oie.int/en/animal-health-in-the-world/official-disease-status/fmd/list-of-fmd-free-members/>, accessed November 5, 2013.

¹⁹⁶ Brazilian Meat Monitor, "Russian Agency Imposes New Restrictions on Brazilian Meat," April 29, 2011, 8; MeatingPlace.com, "Russia Lifts 18-month ban on meat exports from 3 Key Brazilian States," November 30, 2012.

Figure 12 Brazil's annual pork production and consumption, 2008–13 (thousand metric tons, carcass-weight equivalent)



Source: USDA, FAS, Production, Supply, and Distribution database, accessed October 28, 2013.

Producers and regulators in Brazil are striving to gain greater access for Brazil's pork in global markets. In May 2011, three Brazilian pork producers became eligible to export pork to China.¹⁹⁷ In January 2012, six facilities in Brazil were certified to export uncooked pork to the United States. By the end of 2012, the list of establishments approved to export to the United States had grown to 24.¹⁹⁸ In August 2012, Japan recognized pork from the state of Santa Catarina as posing an acceptable risk of FMD.¹⁹⁹ In July 2013, two producers received approval to export pork to Japan, and the first shipment followed immediately.²⁰⁰

The United States and Brazil are both major producers of corn and soybeans, the primary ingredients in many swine rations. As in the United States, feed accounts for the majority of the cost to produce swine in Brazil, and Brazil's swine producers benefit from access to these feed ingredients. Between 2008 and the first-half of 2012 (the latest data available), feed costs and total costs for producing swine in the state of Santa Catarina increased by 10 percent in terms of the Brazilian real, while U.S. average feed costs and total costs for farrow-to-finish producers declined 4 percent and 15 percent, respectively.

The competitive position of U.S. producers improved, in comparison to Brazilian producers, during 2008–11 due to the declining value of the dollar, relative to the real, but the significant appreciation of the dollar in 2012 reversed this trend. Between 2008 and 2011, the U.S. dollar depreciated 8.8 percent relative to the real. However, in 2012, the dollar appreciated substantially relative to the real, such that for the entire five-year period the dollar appreciated

¹⁹⁷ Brazilian Meat Monitor, "Three Companies Get Permission to Sell Pork to China," May 30, 2011.

¹⁹⁸ USDA, FSIS, "Brazil: Eligible Plants Certified to Export Meat to the United States," February 28, 2013, <http://www.fsis.usda.gov/wps/wcm/connect/58370f4a-f455-4fd7-9fe8-bccc763d44a4/Brazil+establishments.pdf?MOD=AJPERES>, accessed November 4, 2013.

¹⁹⁹ MeatingPlace.com, "Brazilian Pork Moves into Japan Slowly, Exec Says, October 3, 2012.

²⁰⁰ Pig Progress, "Brazil Exports First Pork Shipment to Japan," July 15, 2013, <http://www.pigprogress.net/Pork-Processing/Markets/2013/7/Brazil-exports-first-pork-shipment-to-Japan-1310350W/>.

6.6 percent relative to the real.²⁰¹ Because of the appreciation of the U.S. dollar, feed and total production costs in Santa Catarina increased only 3 percent between 2008 and 2012 in dollar terms, making producers in Santa Catarina more cost-competitive with U.S. producers than at any time since 2008 (table 26).

Table 26 Swine production costs in the United States and Santa Catarina, Brazil, dollars per hundred-weight gain, 2008–12

Description	2008	2009	2010	2011	^a 2012
U.S. farrow-to-finish producers					
Feed	37.34	24.26	23.24	34.67	35.93
Hired labor	3.38	3.77	3.98	4.06	4.29
Opportunity cost of labor	7.17	3.25	3.06	2.96	2.92
Capital cost of equipment	11.91	10.44	10.39	10.69	8.73
All other costs	10.08	6.09	6.51	7.09	7.18
Total costs	69.88	47.81	47.18	59.47	59.05
Santa Catarina producers					
Feed	43.77	38.56	37.12	49.67	45.28
Other variable costs ²⁰²	10.63	9.98	13.66	10.55	8.84
Fixed costs ²⁰³	2.97	2.50	3.09	5.15	4.50
Total costs	56.88	51.03	53.88	65.36	58.60

Source: USDA, ERS, USDA, ERS, "U.S. hog production costs and returns per hundredweight gain," CONAB, "Custo de Produção de Suínos para Abate," 2008 through 2012.

^aCosts for Santa Catarina producers in 2012 includes only data January–June.

Producers in the central-west state of Mato Grosso, also an important swine-producing area, are said to have even lower production costs, mainly due to lower feed costs.²⁰⁴ However, these reported costs do not include transportation of swine to slaughter and transportation of pork to port. Transportation adds significantly to the cost of producing pork in Mato Grosso.²⁰⁵

Canada

Canada is the world's fifth-largest swine producer, behind China, the EU, the United States, and Brazil. Canada is also the world's largest exporter of swine. In 2008, Canada's exports of swine, almost all to the United States, were equivalent to about 30 percent of its domestic production. The ratio of swine exports to production fell to 22 percent in 2009, and to 20 percent during 2010–12, even as the number of pigs produced declined. Between 2008 and 2012, the size of the Canadian swine heard and the number of piglets produced decreased 9 percent and the breeding herd decreased 17 percent.

Canada is the world's seventh-largest pork producer, and the third-largest exporter. Over 2008–12, the share of exports in Canada's pork production increased. Canada's pork production increased 2 percent over 2008–12 and exports increased 10 percent, even as swine production

²⁰¹ USDA, ERS, "Nominal Annual Average exchange Rates," accessed October 29, 2013.

²⁰² Variable costs include labor and benefits, veterinary expenses, utilities, and transportation costs.

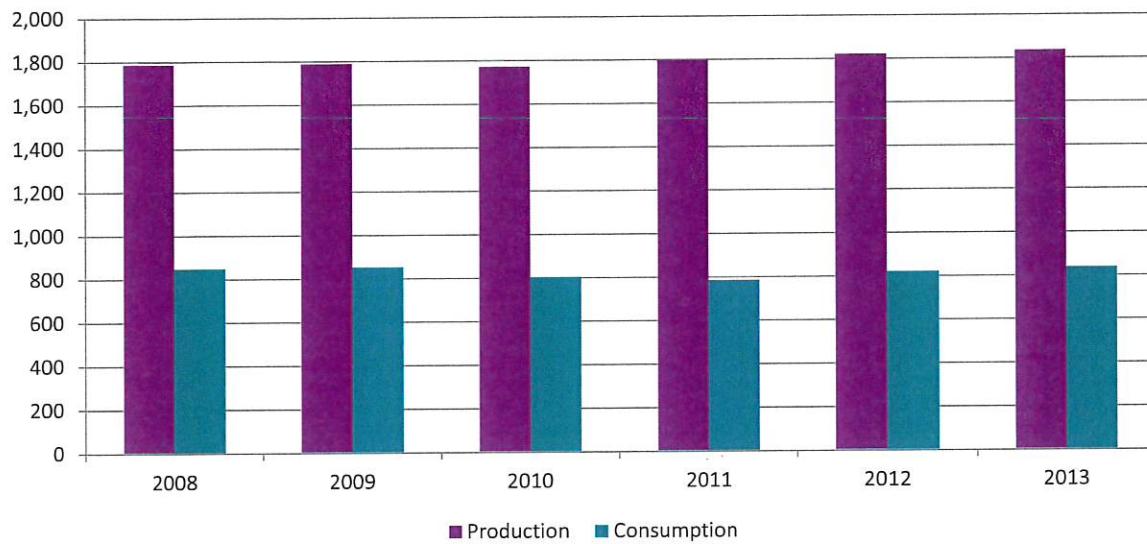
²⁰³ Fixed costs include depreciation of fixed assets and interest.

²⁰⁴ BPEX, "2012 Pig Cost of Production in Selected Countries," October 2013, 8.

²⁰⁵ USITC, *Brazil: Competitive Factors in Brazil Affecting U.S. and Brazilian Agricultural Sales in Selected Third Country Markets*, USITC Publication 4310, April 2012, 10-11.

and slaughter declined. Exports accounted for over two-thirds of Canada's pork production in 2012 (figure 13).

Figure 13 Canada's annual pork production and consumption, 2008–13 (thousand metric tons, carcass-weight equivalent)



Source: USDA, FAS, Production, Supply, and Distribution database, accessed October 28, 2013.

Canada's swine inventory declined substantially in 2009, as many swine operations ceased production due to a combination of high feed costs, low pork prices, and a strengthening Canadian dollar. The government of Canada instituted a Hog Farm Transition Program to assist farmers exiting the industry. The program goal was to reduce the Canadian sow inventory by 250,000. The actual decline was about 120,000, or about 9 percent of the 2008 level.²⁰⁶ However, Canadian pork production rose over 2008–12, as both the number of pigs per sow and slaughter weights increased.

Canada's major export markets include the United States plus markets that are also major U.S. export markets—Japan, Russia, Korea, China, and Mexico. The United States is Canada's largest-volume export market as well as its largest source of pork imports. However, over 2008–12, Canada's pork exports to the United States fell, in volume and as a share of total exports, while exports to Russia and China/Hong Kong have increased. As with U.S. exports, Canada's pork exports to Japan are at higher average unit values than its other export markets, making Japan Canada's highest-value export market (table 27).

²⁰⁶ USDA, FAS, *Canada: Livestock and Products Annual*, GAIN Report No. CA9050, August 31, 2009, 15; USDA, FAS, *Canada: Livestock and Products Annual*, GAIN Report No. CA0030, September 1, 2010, 14, 19.

Table 27 Canada's annual exports of fresh/chilled and frozen pork by country, 2008–13

Destination	2008	2009	2010	2011	2012	2013
Metric tons						
United States	235,605	253,271	267,401	243,550	247,739	285,140
Japan	201,418	199,304	199,710	192,943	177,125	153,452
Russia	107,909	47,947	76,089	127,767	187,033	87,580
China/Hong Kong	17,627	17,290	29,980	60,430	68,383	100,307
Australia	34,881	47,084	38,919	28,060	27,809	28,113
Mexico	22,125	21,579	46,487	26,150	29,984	44,245
All other	192,804	224,964	185,229	191,132	165,029	203,363
Total	812,368	811,438	843,815	870,032	903,102	902,201
Million dollars						
United States	558.5	531.8	723.7	781.6	774.9	904.5
Japan	751.3	709.7	786.4	846.0	787.7	703.8
Russia	232.4	73.7	167.1	339.0	461.9	246.1
China/Hong Kong	80.6	65.3	64.3	121.1	126.8	169.4
Australia	104.4	118.1	113.0	96.2	96.0	93.8
Mexico	35.5	29.5	74.2	40.0	44.7	70.7
All other	282.2	294.9	296.9	432.2	318.6	365.9
Total	2,044.9	1,823.1	2,225.7	2,656.1	2,610.7	2,554.3

Source: Statistics Canada, GTIS Global Trade Atlas.

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Appendix A

Statistical Tables

Table A.1 U.S. pork production by state, 2008–12, million pounds

State	2008	2009	2010	2011	2012
AL	64.2	95.6	65.8	53.6	50.3
AK	0.4	0.6	0.6	0.6	0.4
AZ	75.4	76.5	80.6	92.9	84.1
AR	141.4	109.8	86.4	83.7	88.9
CA	55.8	53.9	56.6	50.0	47.6
CO	281.3	265.9	297.7	299.6	288.8
CT	0.7	0.8	1.1	0.7	0.8
DE	6.4	4.2	4.5	2.9	2.9
FL	7.4	7.9	4.2	4.3	3.4
GA	101.0	98.1	75.4	88.4	98.3
HI	3.4	3.3	4.0	4.0	4.3
ID plus WA	30.6	37.4	46.7	45.8	50.9
IL	1,711.0	1,838.9	1,926.4	1,898.6	2,004.0
IN	1,726.0	1,738.8	1,753.8	1,755.4	1,778.5
IA	9,427.6	9,608.3	9,255.1	9,793.4	10,371.8
KS	868.9	914.7	883.8	930.9	930.3
KY	172.7	174.7	185.5	176.6	171.5
LA	4.7	2.8	3.2	4.3	1.3
ME	2.5	2.1	2.3	3.1	3.0
MD	15.4	15.3	14.4	12.6	11.1
MA	3.4	1.8	3.5	3.0	2.3
MI	575.5	606.3	619.9	618.6	549.5
MN	3,776.5	3,678.0	3,699.1	3,688.9	4,027.9
MS	168.9	179.8	152.2	161.7	155.9
MO	1,746.5	1,694.3	1,288.0	1,322.9	1,339.9
MT	80.1	78.6	79.9	77.2	81.7
NE	1,384.5	1,359.7	1,366.5	1,318.8	1,279.7
NV	1.5	2.7	1.8	1.0	1.9
NH	0.8	1.2	1.0	0.8	1.4
NJ	1.5	1.8	1.7	1.7	1.6
NM	0.8	0.8	0.6	0.4	0.4
NY	27.1	25.3	23.8	28.3	26.4
NC	4,209.9	4,070.8	3,767.1	3,652.5	3,921.1
ND	52.7	60.9	59.7	70.2	57.0
OH	965.7	999.1	1,049.9	1,071.5	1,088.7
OK	1,284.5	1,255.8	1,294.1	1,337.1	1,336.5
OR	11.0	9.5	8.6	7.5	5.2
PA	399.0	414.4	504.2	476.6	511.0
RI	0.7	0.5	0.6	0.6	0.6
SC	91.8	49.9	53.2	49.0	47.9
SD	739.1	671.6	741.1	777.5	805.6
TN	95.7	92.4	99.1	93.7	85.5
TX	317.4	302.6	154.5	198.8	220.9

State	2008	2009	2010	2011	2012
UT	312.3	324.2	303.8	305.2	290.9
VT	1.0	1.3	1.2	1.2	1.4
VA	126.0	110.9	113.7	73.8	68.8
WV	2.6	2.3	1.3	1.9	2.3
WI	201.1	190.3	173.3	175.1	173.7
WY	136.4	122.8	136.6	165.4	165.7
U.S. total	31,411	31,359	30,454	30,982	32,244

Source: USDA, NASS, Meat Animals Production, Disposition, and Income, annual summaries, 2008–13.

Table A.2 Information on the U.S. animal (except poultry) slaughter and processing industry, 2008–11

Measure	2008	2009	2010	2011
Value of product shipments (\$1,000)	114,597,515	109,549,736	122,756,106	140,548,843
Value added (\$1,000)	30,215,808	31,566,269	33,140,081	34,489,434
Number of employees	263,570	264,471	259,697	259,429
Annual payroll (\$1,000)	8,913,667	8,964,988	9,080,668	9,147,694
Employee fringe benefits (\$1,000)	2,219,061	2,447,350	2,480,201	2,515,217

Source: U.S. Bureau of the Census, Annual Survey of Manufacturers, NAICS 31161N.

Table A.3 Pork production, consumption, and trade, selected countries, 2012, thousand metric tons, carcass-weight equivalent

Country	Total production	Consumption	Imports	Exports
China	52,350	52,725	730	235
EU-27	22,630	20,423	2	2,226
USA	10,554	8,438	363	2,442
Brazil	3,330	2,670	1	661
Russia	2,075	3,145	1,070	0
Canada	1,820	820	241	1,243
Japan	1,297	2,557	1,259	1
Mexico	1,227	1,838	706	95
Korea	1,086	1,546	502	2
All other	9,150	10,767	2,030	400
World	105,519	104,929	6,904	7,305

Source: USDA, PSD, accessed October 31, 2013.

Note: Data reported in carcass weight equivalent are not comparable with data on a product weight basis.

Table A.4 China's pork production, consumption, and trade, 2008-12, thousand metric tons, carcass-weight equivalent

Measure	2008	2009	2010	2011	2012
Production	46,205	48,905	51,070	49,500	52,350
Consumption	46,691	48,823	51,157	50,004	52,725
Exports	223	232	278	244	235
Imports	709	270	415	758	730
Trade Balance	-486	-38	-137	-514	-495

Source: USDA, FAS, Production, Supply, and Distribution database, accessed October 31, 2013.

Table A.5 EU-27 pork production, consumption, and trade, 2008-12, thousand metric tons, carcass-weight equivalent

Measure	2008	2009	2010	2011	2012
Production	22,596	22,434	22,571	22,866	22,630
Consumption	21,024	21,057	20,842	20,680	20,423
Exports	1,727	1,416	1,754	2,205	2,226
Imports	56	39	25	19	19
Net exports	1,671	1,377	1,729	2,186	2,207

Source: USDA, FAS, Production, Supply, and Distribution database, accessed October 31, 2013.

Table A.6 Brazil's pork production, consumption, and trade, 2008-12, thousand metric tons, carcass-weight equivalent

Measure	2008	2009	2010	2011	2012
Production	3,015	3,130	3,195	3,227	3,330
Consumption	2,390	2,423	2,577	2,644	2,670
Exports	625	707	619	584	661
Imports	0	0	1	1	1
Trade Balance	625	707	618	583	660

Source: USDA, FAS, Production, Supply, and Distribution database, accessed October 31, 2013.

Table A.7 Canada's pork production, consumption, and trade, 2008-12, thousand metric tons, carcass-weight equivalent

Measure	2008	2009	2010	2011	2012
Production	1,786	1,788	1,771	1,797	1,820
Consumption	848	853	802	785	820
Exports	1,129	1,123	1,159	1,197	1,243
Imports	194	180	183	204	241
Net exports	935	943	976	993	1,002

Source: USDA, FAS, Production, Supply, and Distribution database, accessed October 31, 2013.

Table A.8 Harmonized Tariff Schedule of the United States (HTS) subheadings, descriptions, and column-1 rates of duty for swine and pork, 2012

HTS subheading	Brief description	Column-1 rate of duty	
		General	Special ^a
0103.10.00	Live purebred breeding swine	Free	
0103.91.00	Live swine, other than purebred breeding swine, weighing less than 50 kg each	Free	
0103.92.00	Live swine, other than purebred breeding swine, weighing 50 kg or more	Free	
0203.11.00	Carcasses and half-carcasses of swine, fresh or chilled	Free	
0203.12.10	Fresh or chilled retail cuts of ham, shoulders and cuts thereof, with bone in	1.4 cents/kg (A+,AU,BH,CA,CL,CO,D,E,IL,JO,KR,M A,MX,OM,P,PA,PE,SG)	Free
0203.12.90	Fresh or chilled hams, shoulders and cuts thereof, with bone in, other than processed	Free	
0203.19.20	Meat of swine nesi, retail cuts, fresh or chilled	1.4 cents/kg (A+,AU,BH,CA,CL,CO,D,E,IL,JO,KR,M A,MX,OM,P,PA,PE,SG)	Free
0203.19.40	Meat of swine, nesi, non retail cuts, fresh or chilled	Free	
0203.21.00	Carcasses and half-carcasses of swine, frozen	Free	
0203.22.10	Frozen retail cuts of hams, shoulders and cuts thereof, with bone in	1.4 cents/kg (A,AU,BH,CA,CL,CO,E,IL,JO,KR,MA,M X,OM,P,PA,PE,SG)	Free
0203.22.90	Frozen hams, shoulders and cuts thereof, with bone in, other than retail cuts	Free	
0203.29.20	Frozen retail cuts of meat of swine, nesi	1.4 cents/kg (A,AU,BH,CA,CL,CO,E,IL,JO,KR,MA,M X,OM,P,PA,PE,SG)	Free
0203.29.40	Frozen meat of swine, other than retail cuts, nesi	Free	

Source: USITC, Harmonized Tariff Schedule of the United States (2012) supplement 1 (revision 1), October 31, 2012.

Note: "nesi" = "not elsewhere specified or included."

^aPrograms under which special tariff treatment may be provided and the corresponding symbols for such programs as they are indicated in the "Special" subcolumn are as follows:

Generalized System of Preferences (A, A* or A+); United States-Australia Free Trade Agreement (AU); United States-Bahrain Free Trade Agreement Implementation Act (BH); North American Free Trade Agreement: Goods of Canada (CA); United States-Chile Free Trade Agreement (CL); Colombia-U.S. Free Trade Agreement (CO); African Growth and Opportunity Act (D); Caribbean Basin Economic Recovery Act (E or E*); United States-Israel Free Trade Area (IL); Andean Trade Preference Act or Andean Trade Promotion and Drug Eradication Act (J, J* or J+); United States-Jordan Free Trade Area Implementation Act (JO); Korea-U.S. Free Trade Agreement (KR); United States-Morocco Free Trade Agreement Implementation Act (MA); North American Free Trade Agreement: Goods of Mexico (MX); United States-Oman Free Trade Agreement Implementation Act (OM); Dominican Republic-Central America-United States Free Trade Agreement Implementation Act (P or P+); Panama-U.S. Free Trade Agreement (PA); United States-Peru Trade Promotion Agreement Implementation Act (PE); and United States-Singapore Free Trade Agreement (SG).